Consulting Engineer

September 1959

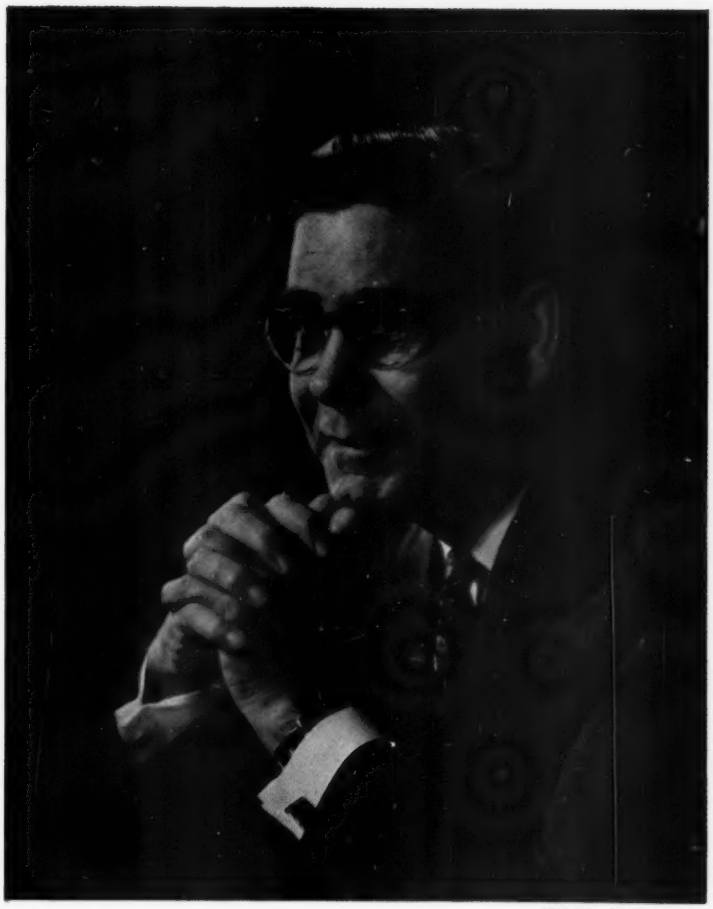


Photo by Fabian Bachrach

C. C. PARKER, of Hamilton, Ontario, President of the Association of Consulting Engineers of Canada, president of two consulting engineering firms and vice president of a third, thinks the day of the ivory tower is gone for the engineer. "Engineering today is a team effort, and the consulting engineer should recognize this in the best interests of both his business and his profession." As Parker put it in a recent Newsletter sent to ACEC members, "the day of the lone consultant is past; we all have associates or partners. The complexity and size of projects demand

Continued on Page 16



The Advantages of ADVANCE KOOL KOIL Fluorescent Lamp BALLASTS Come in 1969

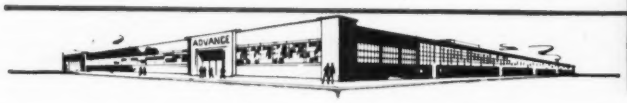
As time goes into the 1970's, you'll find ADVANCE Kool Koil Fluorescent Lamp Ballasts operating long after others have failed.

ADVANCE engineers tested new grades of steel, larger diameter wire . . . developed special insulating materials and compounds . . . separated vital components in the ballast case so the capacitor would operate at temperatures far below its guarantee limits. Then, after three years of this exhaustive research ADVANCE perfected Kool Koil Fluorescent Lamp Ballasts . . . ballasts which operate 16.5°C. to 19.5°C. lower than any other ballast tested in a standard 40°C. C.B.M. and U/L heat box.

Because ballast life is cut in half for every 10°C. over normal operating temperatures, Kool Koil Ballasts operating up to 20°C. cooler give you extra years of trouble-free ballast operation and added protection that ends costly maintenance and interruptions in service.

Always insist on Kool Koil Fluorescent Lamp Ballasts . . . the extra benefits will come as time goes into the 1970's . . . and after.

"The Heart of the Lighting Industry"®



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World's Largest Exclusive Manufacturer of Fluorescent Lamp Ballasts

TRANSFORMER CO.

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Ric-wiL Underground Piping Systems are safe and secure from tornadoes and hurricanes . . . virtually unaffected by surface weather conditions. In recent years, changing weather patterns have brought severe storms to areas in the United States that had never before experienced them. Ric-wiL Underground Systems remained unharmed . . . and in an emergency situation, immediate heat can be an important factor in restoring operations as quickly as possible.

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Write, wire or phone for information on the many types of Ric-wiL Systems available.



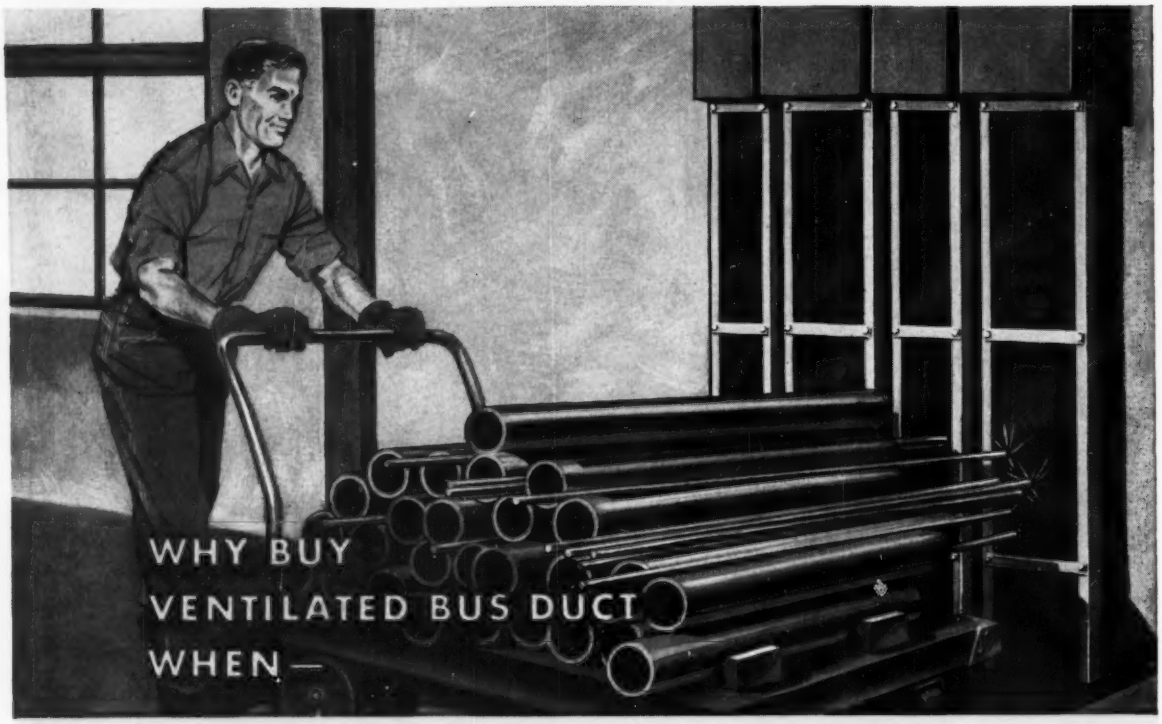
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Square D TOTALLY ENCLOSED Duct* is SAFER—*and costs no more*

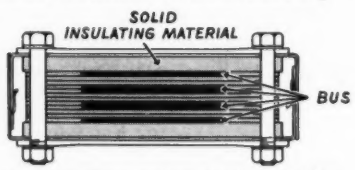
*(low impedance)

• Ventilated bus duct may be as vulnerable as it looks. In fact, Paragraph 3644 of the National Electrical Code prohibits its use in certain areas by specifying:

> **"Busways may extend vertically through dry floors if totally enclosed (unventilated) where passing through and for a minimum distance of six feet above the floor to provide adequate protection from mechanical injury."**

All Square D low-impedance duct is totally enclosed! It has no ventilation holes open to falling objects or dust. It's smaller than ordinary ventilated bus duct. It mounts in any position without de-rating. Doesn't it make sense, when buying low-impedance duct, to specify a product that's safer? Square D totally enclosed low-impedance duct costs no more—why settle for less!

Here's Why Square D's EXCLUSIVE Design makes ventilation unnecessary



The entire space within the duct and between the bus bars is filled with a solid insulating material which conducts the heat to the surface. There are no dead air spaces inside the duct. Square D totally enclosed low-impedance duct is listed with Underwriters' Laboratories and meets U/L requirements for temperature rise in any mounting position.

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT... NOW A PART OF THE SQUARE D LINE

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Consulting Engineer®

For Engineers in Private Practice

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September 1959 • VOLUME XIII • NUMBER III

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Steel bridge carrying US Route 22 over Bushkill Creek in the vicinity of Easton, Penna.



John R. Dietz, Vice President, Earl D. Schwartz, Chief of Bridge Section, and W. H. Corddry discussing an artist's rendering of a steel bridge over the Southwest Freeway in the District of Columbia.

Steel enjoys wide use in short-span bridge design

at Gannett, Fleming, Corddry & Carpenter, Inc., Consulting Engineers, Harrisburg, Penna.

This firm has designed short-span steel bridges for many important highways. These include the Pennsylvania, New Jersey and West Virginia Turnpikes; the Connecticut Expressway; Garden State Parkway; Penn-Lincoln Parkway, Pittsburgh; Schuylkill Expressway, Philadelphia; and Southwest Freeway, Washington, D. C.

Normally, 70% of their short-span bridges are designed in steel. There are many good reasons for this, according to Mr. John R. Dietz, Vice President of the firm. Here are a few:

Steel is a familiar material. There is a tremendous library of knowledge accumulated on steel and there are no unknown factors. This is important because the designer is looking for reliable performance.

Steel goes up in a hurry. Short spans must be constructed with least interference with traffic. The rapidity with which steel can be erected is a big advantage.

Steel permits maximum headroom. Also minimum approach alteration, less dislocation of existing buildings and roads and lower costs.

Steel reduces costs. Lighter construction with steel reduces foundation costs and faster erection saves labor. New high-strength steels offer greater strength with less bulk.

Steel production facilities have increased. The steel industry has greatly expanded its facilities for manufacture of structural shapes and plates. You can confidently design in steel—the material you know best, and the material that offers you the most. *USS is a registered trademark*

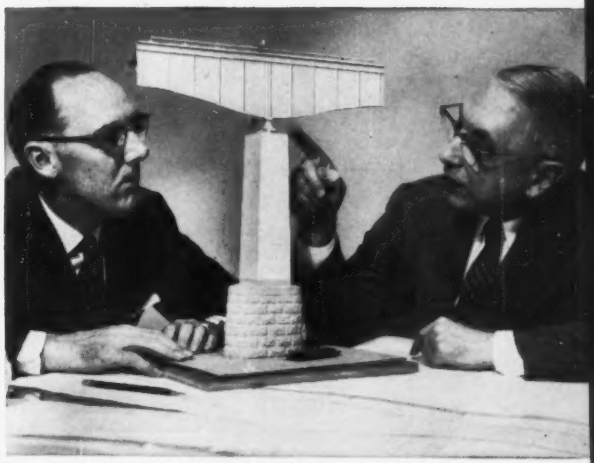
USS

United States Steel Corporation—Pittsburgh
Columbia-Geneva Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company

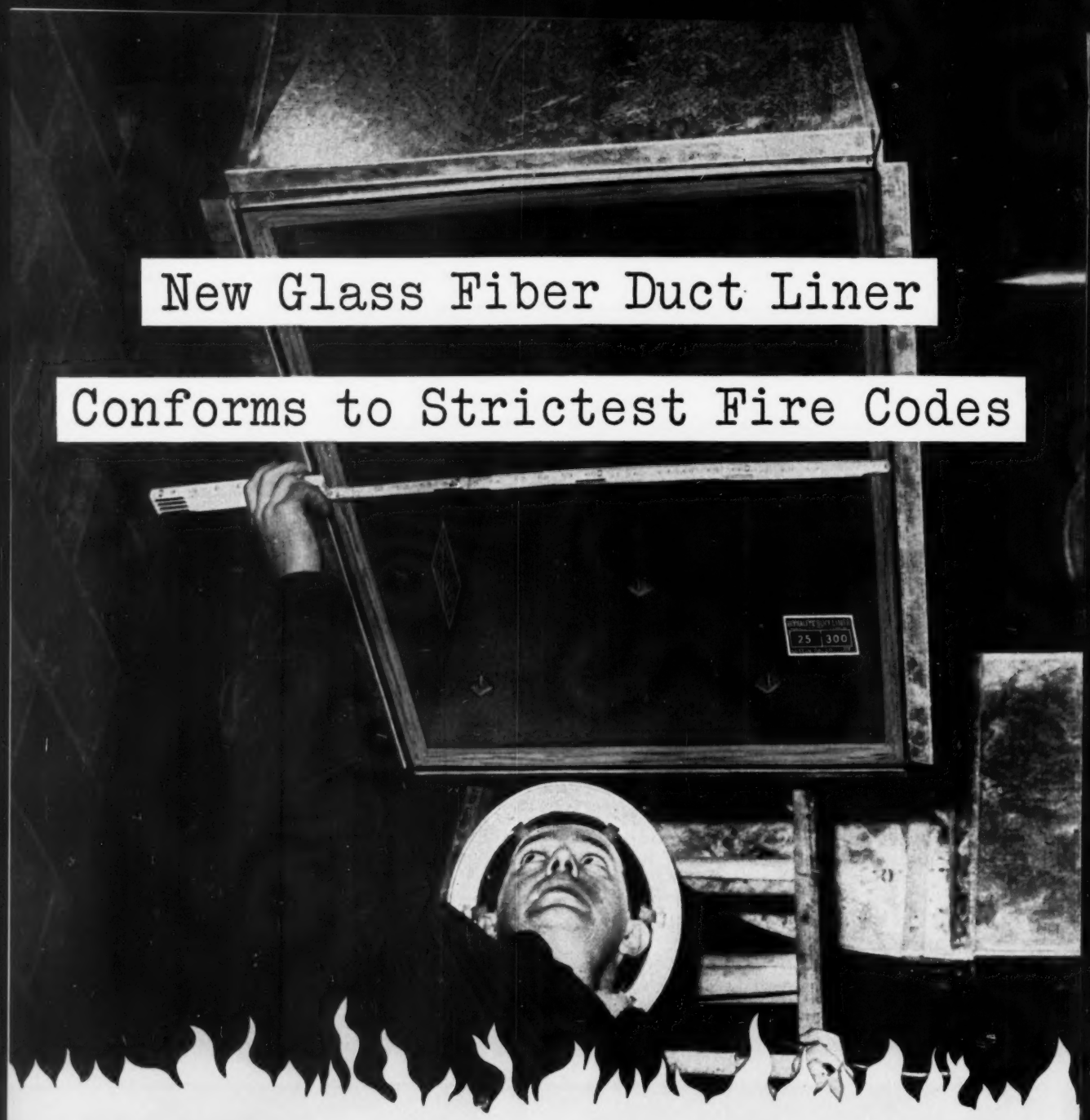
United States Steel



Steel bridge carrying Route 22 over Route 309 near Allentown, Penna. Steel is versatile and available. It can be readily welded, flame-cut, riveted, bolted.



Mr. Dietz (left) and Mr. Schwartz discussing a model of a welded steel girder on an elevated pier..



ULTRALITE® Gustin-Bacon's well-known glass fiber duct liner, is now available with a newly developed-and-approved gray fire resistant coating. The new product carries a flame spread classification of less than 25 and complies with *all* requirements of the National Board of Fire Underwriters' Bulletin #90-A and B and the strictest fire codes.

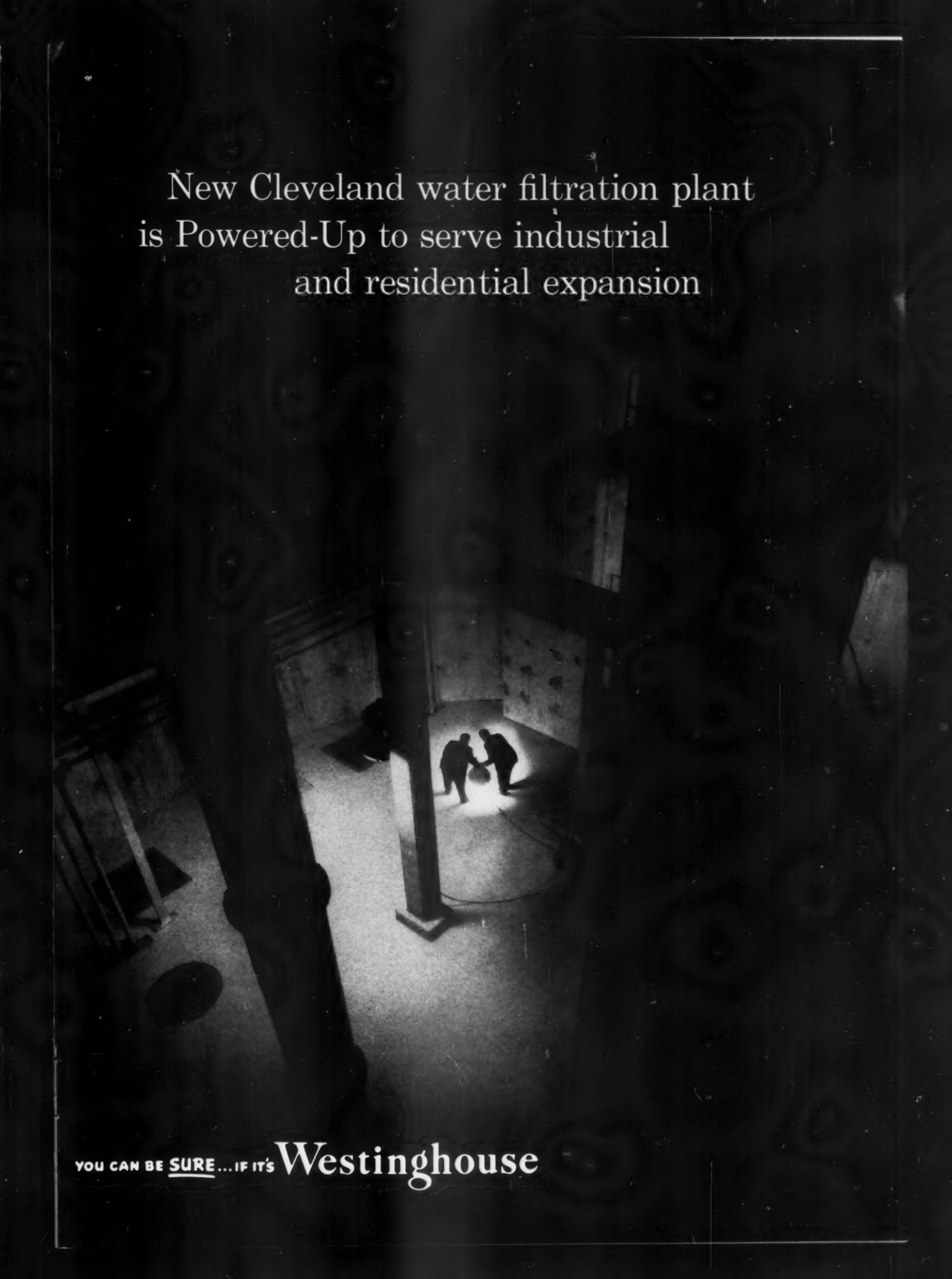
ULTRALITE duct liner carries an Underwriters' Laboratories label. It is the only liner permanently stamped with density and flame spread classification . . . the only liner made exclusively of long strong textile-type glass fibers that impart extra strength, resilience and resistance to air erosion. All this—plus ULTRALITE'S famous thermal and acoustical efficiency—are now available at no greater cost than conventional coatings.

For specification data and samples, call your G-B distributor (listed in the Yellow Pages) or write

GUSTIN-BACON Mfg Co

212 W. 10th, Kansas City, Mo.

Thermal and acoustical glass fiber insulations • Molded glass fiber pipe insulation • Couplings and fittings for plain and grooved end pipe

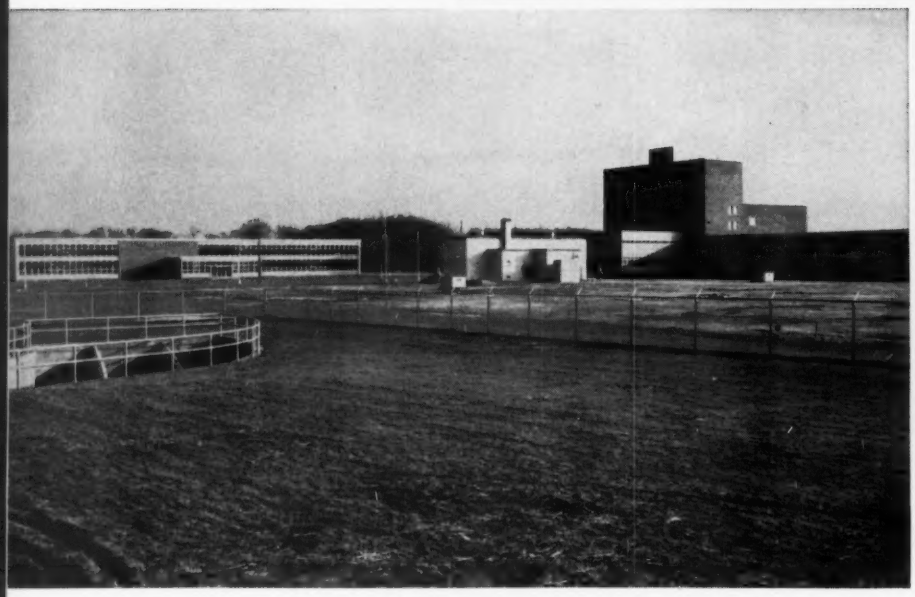

New Cleveland water filtration plant
is Powered-Up to serve industrial
and residential expansion
YOU CAN BE SURE... IF IT'S Westinghouse

Cover photo:
View of raw water pump suction wells illuminated by Westinghouse VEK-16 floodlighting.



Project group discussing layout of Crown Filtration Plant includes J. E. Hrovat, Vice President of Engineering, Doan Electric Co., Electrical Contractors; E. E. Croushore, Westinghouse Construction Sales Engineer; L. O. Meyer, Branch Sales Manager, WESCO, Cleveland; Dan Kasych, Chief Engineman, Pump Building; G. L. Baughman, Chief Electrical Engineer, Havens and Emerson, Consulting Engineers; S. C. Simmermacher, Chief Mechanical Engineer, City of Cleveland; M. B. Trimble, Westinghouse Construction Sales Engineer; E. S. Goulder, President, Doan Electric Co.; and H. M. Stafford, Salesman, WESCO, Cleveland.

J-94123-R2



Over-all view of Crown Filtration Plant, Cleveland, Ohio. Pump building is at left and the filter building at right. Westinghouse OV-20 street lighting was provided for plant entrances and roadways.



Dan Kasych and E. E. Croushore examine one of the two Westinghouse 5000-kva power transformers which step incoming 34.5-kv service down to 4160 v for main pump drives.

Westinghouse system provides for 100% electrical load increase in new water pumping station

The new Crown Filtration Plant was designed to meet the growing need for water supply in the westerly suburbs of Cleveland, Ohio, and, as an important part of that planned expansion, the Westinghouse electrical system presently installed provides for 100% load increase without adding to the system.

The pumping station-filtration plant is located on a 55-acre site and is the newest addition to the city's expanding water supply system. Construction was started in 1953 and completed in 1958, and represents nearly a $20,000,000 investment. Present plant capacity is 50 mgd; but, because of anticipated future requirements, the plant has space and provision for additional equipment to provide capacity of 100 mgd.

Raw water is obtained through a crib 2½ miles offshore in Lake Erie. The water from the crib is carried through a connecting tunnel to a raw water well, where its handling is taken over by submerged raw water pumps. Treatment and flow of the water from this point through the filtration plant are automatic and exactly controlled, leading finally to a 15-million-gallon filtered water reservoir located in the southwest corner of the plant area. Six service pumps deliver the water from the reservoir to both the low service zone and the first high service zone supplied by the Crown plant.

The major electrical elements supplied by Westinghouse to Power-Up this filtration operation include:

Two 5000-kva power transformers—to step utility service from 34.5 down to 4.16 kv.

Main metal-clad switchgear—to control and distribute power to motor starters (for L.S.) and provide for starting of H.S. motors (1750 hp).

Dry-type power center—to provide 480-v service to plant auxiliaries.

Westinghouse lighting throughout the plant area, including fluorescent, incandescent, street lighting and floodlighting.

In addition, Westinghouse supplied the many panelboards required in the plant's operation.

The planned Powering-Up of the Crown Filtration Plant means it can meet all foreseeable future requirements with a minimum of modification. Additional water handling and treating facilities can be installed in areas already provided for them. And all such additional equipment can be operated without adding to the existing electrical distribution system.

Cleveland now has surplus water capacity in its plants, and is in an enviable position with an almost unlimited supply of good Lake Erie water. It is ready and willing to construct additional facilities to process and deliver this water whenever the need for a greater supply for new industry is indicated.

(*contd.*)

YOU CAN BE SURE...IF IT'S Westinghouse

J-94123-R3



View in main switchgear room with G. L. Baughman, M. B. Trimble and S. C. Simmermacher examining Westinghouse metal-clad switchgear. Lineup at right contains main incoming line breakers, bus tie breaker, reactor starters for high service pump motors, and feeder breakers for power center and low service pump motor starters. Five-kv bus duct overhead provides connections from metal-clad switchgear to Ampgard* high-voltage fused starters at left. *Trade-Mark



Dan Kasych inspects switchgear room. Westinghouse 225-kva power center utilizes dry-type transformers and DB low-voltage air circuit breakers to supply power panels throughout pump building. Room lighting is Westinghouse 2 SPC-75 slimline fluorescent luminaires.



Westinghouse CDP power distribution panelboard and wall-mounted 37.5-kva dry-type transformer feeding NLAB lighting panelboard.



(contd.)

Electrical system provides for 100% load increase

Powering-Up electrically for future growth can mean important benefits and savings for you. For further information, call the Westinghouse electrical construction engineer nearest you, or write: Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania. J-94123-R4

OWNER: City of Cleveland, Ohio
CONSULTING ENGINEER: Havens and Emerson, Cleveland, Ohio
CONSULTING ARCHITECT: Small-Smith-Reeb and Draz, Cleveland, Ohio
GENERAL CONTRACTOR: The Hunkin-Conkey Construction Co., Cleveland, Ohio
ELECTRICAL CONTRACTOR: Doan Electric Co., Cleveland, Ohio
WESTINGHOUSE DISTRIBUTOR: Westinghouse Electric Supply Co., Cleveland, Ohio

Over 250 Pages Westinghouse Data in Sweet's Construction File.

YOU CAN BE SURE...IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

Section of main pump floor showing the three 25-mgd first high service pumps and three 8-mgd low service pumps which are presently installed. Metal-clad switchgear cubicles and Ampgard high-voltage starters for these and two additional future pumps of each rating are installed in the main switchgear room. High bay mercury-vapor lighting is provided by Westinghouse Millite® luminaires.

View in filter building showing row of clarified water filter beds. Under average flow conditions, the 12 filters in the plant will pass a total of 50 mgd. Lighting is supplied by Westinghouse VEK-16 floodlights.



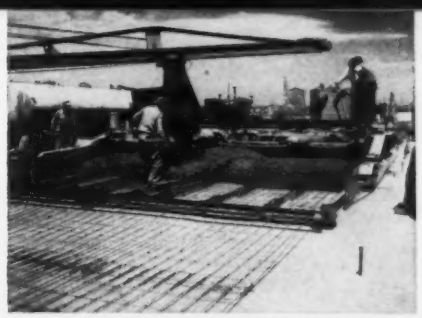
Colorado is building 964 miles of Interstate Roads

with help of USS Highway Products

An impressive sight in Colorado these days is the explosive growth of first-rate roads. The Interstate Highway Program is in full swing. $324,300,000 in federal and state funds is being spent to construct 964 miles of new Interstate Highways and 5,200 new bridges. Already, more than 163 miles have been completed at a cost of about $20,700,000. The 8,433 miles of older roads in Colorado will receive a $2 billion modernization. Plans for the entire program are based on an expected 1975 traffic volume of 6½ million vehicles —over 3 times greater than present loads. This work is under the direction of Joseph J. Marsh, Chairman, Colorado Highway Commission, and Mark U. Watrous, Chief Highway Engineer.

United States Steel makes a complete line of highway products: Structural carbon steel, high-strength and constructional alloy steels for bridges; steel H-piles, sheet piling and tubular piles for bridge foundations; drainage products; cements for all types of concrete construction; slag, reinforcing bars and welded wire fabric; wire rope, cable, tubing and special steels for construction equipment; fence; beam and cable guardrail, steel for signs . . . and dozens more.

USS is a registered trademark





Colorado's highway engineers devised this efficient non-stop slip-form paver. In one continuous operation, machine raises pre-joined strip of welded steel wire fabric to desired height, pours concrete through fabric and over it, levels the surface, forms a perfect edge with the moving edge-guide, and leaves behind a virtually completed concrete highway.

Section of structural steel elevated highway in Denver, connecting north-south Interstate Road with road planned from Denver into Utah. This road to the west crosses the rugged Rockies, requiring an exceptional number of bridges.

At Colorado Springs, this 393-foot bridge provides quick routing for four lanes of traffic through town on U.S. 85 and 87. Steel reinforcing bars in these tapered piers assure the extra strength needed in this interesting construction.



USS United States Steel

The highway market is served by the following divisions of United States Steel; American Bridge Division, Pittsburgh, Pa.; American Steel & Wire Division and Cyclone Fence Dept., Cleveland, Ohio; Columbia-Geneva Steel Division, San Francisco, Calif.; Consolidated Western Steel Division, Los Angeles, Calif.; National Tube Division, Pittsburgh, Pa.; Tennessee Coal & Iron Division, Fairfield, Ala.; Universal Atlas Cement Division, New York; United States Steel Supply Division, Steel Service Centers, Chicago, Illinois.

In busy Denver area, steel bridge construction provides maximum clearance on short span. Tubular light poles, bridge rails, and sign supports of hot-dipped galvanized steel provide long, maintenance-free service.

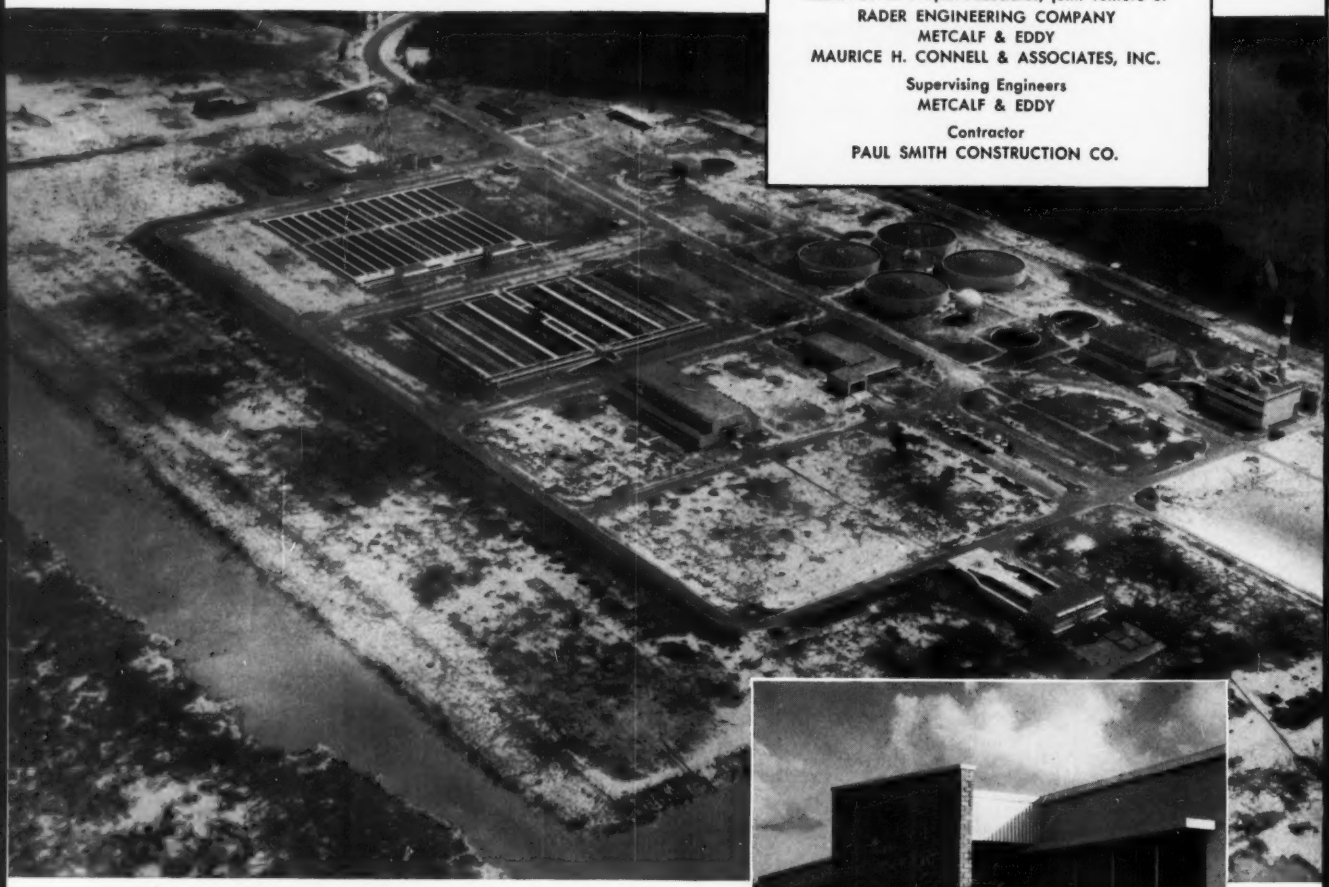


CITY OF MIAMI
SEWAGE TREATMENT PLANT

Design Engineers
Miami Sewer Project Associates; joint venture of
RADER ENGINEERING COMPANY
METCALF & EDDY
MAURICE H. CONNELL & ASSOCIATES, INC.

Supervising Engineers
METCALF & EDDY

Contractor
PAUL SMITH CONSTRUCTION CO.



Aerial view of Miami's $27,100,000 collection and treatment facilities shows extensive layout required to rid Biscayne Bay and the Miami River of pollution.

Modern design and layout contribute to the high efficiency of this multi-million dollar plant.

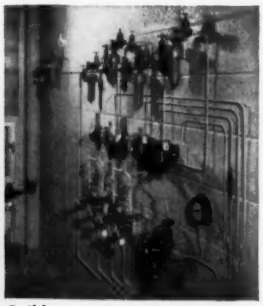
ONE SOURCE
ONE RESPONSIBILITY



Builders self-actuated Rate-of-Flow Controllers at Effluent Water Treatment Plant assure accurate regulation of flows, filter efficiency . . . conserve head.



B-I-F *standard* main recording panel which centralizes essential operating data from remote stations.



Builders custom hydro-pneumatic accessories provide positive valve control and are capable of manual operation on loss of air.



Flow rate through Parshall Flume is transmitted pneumatically to several indicators and recorders installed at strategic operating points.





For New 47,000,000 GPD Treatment Plant...

SINGLE, RESPONSIBLE SOURCE FURNISHES COMPLETE INSTRUMENTATION, CONTROL AND CHEMICAL FEEDING EQUIPMENT

B·I·F *Builders-Providence* **equipment plays vital role in maintaining Miami's high rate activated sludge type installation at peak efficiency.**

Miami's new sewage treatment plant covers a 65 acre site on Virginia Key. A fully integrated control system is needed to centralize the operation of the many functions involved in such a widespread installation.

When this equipment is supplied by a single responsible source, the coordination of efforts during the planning, installation and start-up stages results in immediate and long term savings both in time and money.

Miami, like so many other municipalities, is benefiting from B-I-F's ONE SOURCE — ONE RESPONSIBILITY. For greater system reliability and operating economies, write . . .

B-I-F Industries, Inc., Utilities Sales, 512 Harris Avenue, Providence 1, R. I.

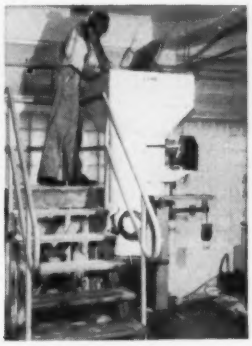
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B-I-F INDUSTRIES

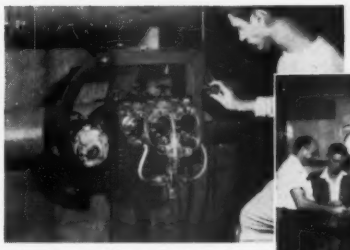
BUILDERS-PROVIDENCE • PROPORTIONEERS • OMEGA

Modern rate-of-flow pendulum-operated diaphragm units provide continuous, dependable flow regulation over 24 to 1 range.

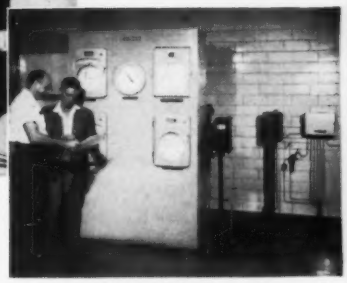




Omega Universal Dry Feeder accurately proportions lime to flow rate of effluent water treatment . . . conserving chemicals and insuring correct dosage despite output variations.



In pipe gallery, operator uses Proportioneers Chem-O-Feeder to add correct dosage of foam control chemicals . . . reliable equipment on standby duty!



Another B-I-F *standard* panel records aeration air, air temperature (wet and dry bulb), digester gas burned by engines, and indicates air to sewage ratio. Wall-mounted summator at right gives *accurate and continuous summations* of air output of four blowers.



Builders Conveyoflo meter accurately totalizes as well as indicates hourly rate of filtered sludge discharged to incinerator. B-I-F supplies a complete line of equipment (meters, feeders, controls) for *positive control of materials in motion.*

C. C. Parker

– *Starts on front cover*

corporate action. Our clients likewise are not individuals but groups, governmental or private. As such they and their works are not of a lifetime but continuous and lasting.

"The works we bring into use for them are lasting and will be used by their and our successors 50 or 100 years hence. Therefore our clients desire consultants who, like them, will serve future generations. Can we offer that kind of service?"

Parker, whose firms are incorporated, said that in Ontario engineers and architects alike sometimes are selected on the basis of expected continuity of their practice. "One man cannot handle this type of thing. The client is entitled to protection in the event of the death of an associate or a partner in an engineering firm. Although engineering partnerships have continued through many decades, the corporate organization of a consulting practice seems to be simpler and more satisfactory."

Licensed Firms?

Today, the engineers must be licensed. Tomorrow, Parker predicted, companies and partnerships will be licensed. "However, this is a provincial matter and not in our hands, we are a national organization.

"We must accept the fact that large manufacturers and constructors do enter the field of engineering design. In engineering, as in life, all is not black or white, and the practice of engineering design by corporations whose main object is manufacture or construction is a case in point."

But Parker maintains that through registration, control could be exercised over corporations as it now is over individuals. "I think one requirement is essential – that the majority of stock must be held by professional engineers, who are free of commitment to nonengineers."

What if engineering corporations offer stock for sale to the public, as one large firm recently did? Parker thinks this possibly could happen in Canada. "Taxes are so heavy that it is almost impossible to retain the necessary cash reserves to use as working capital in periods of rapid expansion. I can foresee instances where financial need might force engineering corporations into selling stock to acquire the necessary working capital."

Parker said, "Engineers can retain policy and management control by never selling too large a portion of their stock on the open market. It can be written into stock disposal agreements that on the death of an associate, the remaining associates must purchase the deceased's stock. Ability to so purchase can be covered by life insurance. The biggest problem, we have found, is to agree on stock value. Public listing, as one New York firm found, solves this."

Today's design team creates another problem. Few large architectural firms are without engineers on their staffs, and many of the larger consulting engineering firms have architects on their staffs. Parker is not fighting this arrangement, but he does think architects should recognize the senior engineers on their staffs at a management level and in the title of the firm. Engineers should elevate the architects in their firms to equal rating.

Does the creation of engineering departments in architectural firms deprive the consulting engineers of work? "Probably, but when an architectural firm is large, it will often feel competent to handle the entire project. If they are going to do engineering, then let us work out some method of assuring the public that they will do good engineering. Having an engineer as one of the principals and eligible for ACEC membership would help this materially."

In Ontario, consulting engineers currently are dealing from strength in engineer-architect-client relationships. A recent court case clearly outlined the instances in which the engineer, rather than the architect, should hold the final responsibility.

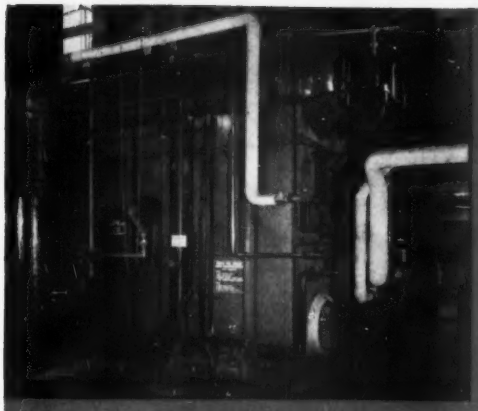
Elements of Practice

Parker said that consulting engineers often must be content with the fields of design and supervision. ("And remember that a design never is completed until it is turned over to the client in working order.") Planning, for instance, is a satisfying and challenging job for a consultant, and it frequently is to the client's advantage to have a consultant acting in an advisory capacity. "But the engineers should remember that the client, whether a highway department or an industry, has a great interest in continuity, method and economy of operation. For these reasons, and others, it is rightly the client who has the final say in the area of planning."

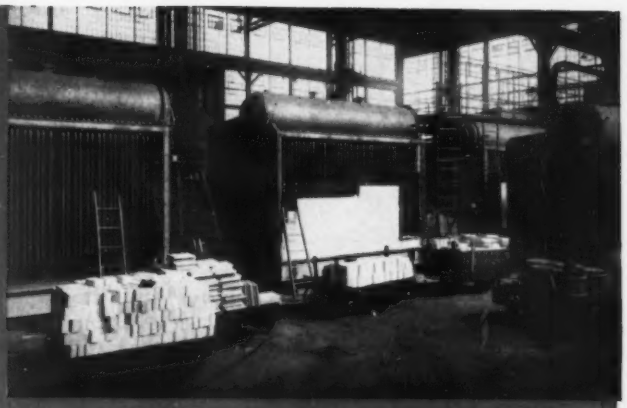
Perhaps the most clearly defined field for the consultant is in public works. "The consultant brings ideas across boundaries, be they international, state, or provincial, and does so most effectively."

It has been stated that Canadian consulting engineers are lucky. Their government is on their side. "It may be that we get more consideration from our government," Parker said, "but Canada has a smaller population than the United States and a much smaller Federal Government. Personal contacts are perhaps easier to make."

Even so, the Canadian consultants have their problems. During the past year, ACEC submitted a brief to the Prime Minister complaining of the trend toward "socialized engineering." They pointed out the economic advantages of restricted government engineering departments handling main-



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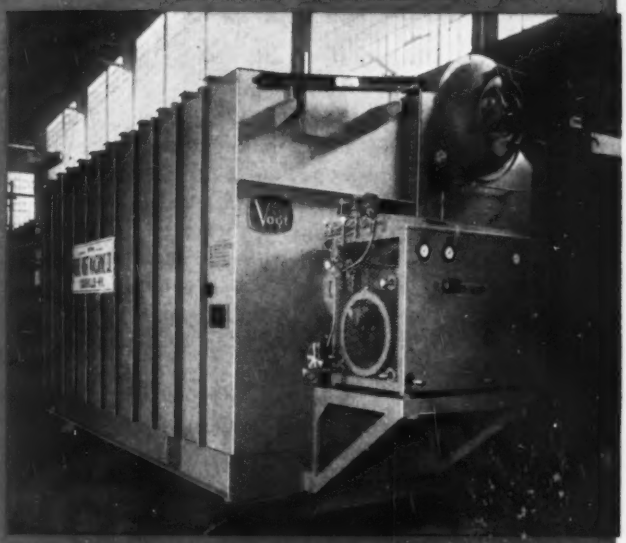
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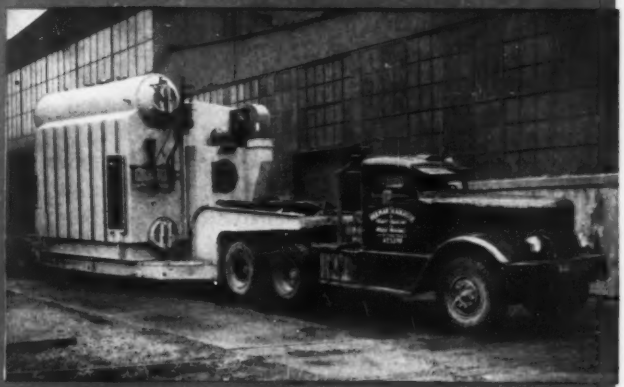
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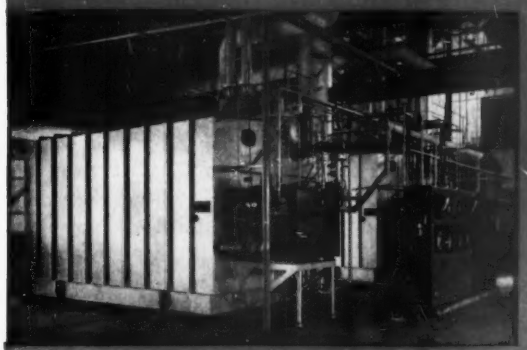
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Dues and Membership Problems

ACEC's current problems are practically identical with those of the Consulting Engineers Council, Parker added. For instance, the Canadian Association has had heated arguments over the dues structure, with talk of putting dues on a sliding scale. This currently is being studied both by CEC and ACEC, although it looks as if a change of structure probably will come quicker in the U.S.

Parker also feels strongly that "it is time for the Canadian Association to grow, or it will become an effete organization, meeting at regular intervals for lunch." Here Parker thinks the lack of recognition of today's engineering team effort is a drawback. Some of the membership place too much emphasis on individual effort and professionalism as it applies to individual ethics. We must strive for improved corporate practice and ethics, better client relations, and improved understanding of our role among the engineering societies.

"We anticipate a rapid increase in membership during the next few years as the recent rash of new consultants reach suitable age for admittance," Parker said. "Therefore, now is the time to take stock of our organization. We are not hindered by our charter and bylaws but by our interpretation. For instance, what constitutes 'well established' in consulting practice?"

Parker suggested that this growth might come about through creation of an associate membership. This would allow the older and more experienced engineers to offer guidance in consulting practice and ethics during the formative years of the young consultant. By keeping a distinct separation between the associate and full membership grades, ACEC could retain its stringent requirements for full membership and also maintain the prestige that goes with this full membership.

Another goal Parker has set for the Association during his term as president is closer cooperation between the Canadian and United States consulting engineer groups. "I do not think a merger of ACEC and CEC is probable or desirable, at any time. But I would like to see the two groups form a joint committee, which could review mutual problems, and maintain a mutually profitable interchange of ideas and literature on group activities."

The first problem Parker would like referred to the joint ACEC-CEC committee is reciprocal practice for licensed engineers in the two countries. "I realize that the difficulties lie in registration laws. For instance, a Canadian has trouble practicing in New York State because of licensing restrictions, and I know engineers from the States have their troubles when they try to practice in Canada. However, I feel that through discussion, both sides could gain a better understanding of the problems involved. Then we could go to the licensing bodies involved with intelligent suggestions rather than mere complaints."

Parker has suggested the formation of this joint committee, but so far nothing has come of the suggestion. He first mentioned it at the New York CEC annual meeting, and again in correspondence to CEC President Ralph Westcott. Parker still is hoping for some indication of interest from CEC.

What of the International Federation of Consulting Engineers (FIDIC)? Parker predicts that membership in the international organization will result in Canadian and United States engineers becoming more interested in foreign projects. "This is particularly important to the Canadian, because we are economically vulnerable to trends beyond our control. I can see a growing interest in working abroad. A few years ago not more than six ACEC members had done foreign work. Today many of the members would take a foreign project if they had the opportunity."

In foreign work, do the Canadians feel they are at a disadvantage as compared to United States' engineers with the World Bank, the United Nations, and other such groups having headquarters in the United States? "We are truly impressed with the international character of such groups, particularly the World Bank. The World Bank staff members hide their individual nationalities most effectively."

Parker, whose firm did a survey and report on the Burma Highway Department and its road system under the Canadian Colombo Plan, feels Canadians have another advantage. They are welcomed by the rapidly developing nations. "Oriental people particularly find it difficult to believe that assistance from the U.S. and U.K. is an outright gift with no strings attached." On his Burmese project, for instance, a request was made for an entire team of Canadians.

International Practice

Parker, who is the president of C. C. Parker and Associates Limited, Hamilton and London, Ontario; and chairman of the board of C. C. Parker, Whittaker & Company Limited, Edmonton and Calgary; also is vice president of C. C. Parker & Parsons, Brinckerhoff Limited, Hamilton, Edmonton, and New York. Since in the third of these he joins with a New York City firm, Parker obviously does not share the views of some Canadians toward competition from the States.

"In 1957, my firm joined Parsons, Brinckerhoff, Hall and Macdonald in a joint venture to design



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and supervise expressways in the City of Hamilton, Ontario. For me, working with a U.S. firm is pleasant and rewarding. We have local experience and capacity to complement their broad experience in the fields of private and public works.

"Of course, there will always be an undercurrent of resentment between some Canadian and some U.S. engineers. But remember, there is that same resentment toward British consultants. We have had instances of our government giving preference to British engineers. Engineering, like science, tends to overflow boundaries. This is rightly so.

"There may still be some smuggling of plans and specifications into Canada. I do not know."

However, there has been a general tightening on importation of technical data. Parker just completed a job where a portion of the plans were drawn in the New York City offices of Parsons, Brinckerhoff. "We paid duty, even though the two firms have formed a partnership, and despite the fact that this was a government project." Parker also mentioned that the City of Hamilton paid duty on engineering designs done in Philadelphia. The duties imposed are reasonable and not excessive.

Heritage and Experience

Parker, whose father was a fruit farmer, cannot remember a time he did not want to be an engineer. At the University of Toronto he gained an interest in consulting engineering from Prof. C. R. Young, then head of the Department of Civil Engineering, and later Dean of the Faculty of Applied Science and Engineering.

From the University of Toronto he obtained an undergraduate degree BA.Sc., in 1929, and a graduate degree, MA.Sc., in 1933. His graduate work was in Advanced Structures with research and a thesis on "Secondary Stresses in Riveted and Welded Truss Connections."

One summer vacation, Parker worked for J. Morrow Oxley, of Chapman and Oxley, Architect-Engineer, Toronto. Mr. Oxley was a meticulous structural engineer responsible for many of Toronto's first tall office buildings.

During 12 years of his early career, Parker was a field engineer and a bridge design engineer for the Department of Highways, Ontario. "I sought experience, rather than salary. I feel that any young engineer who plans to go into consulting work should approach a career in this manner."

Consulting Projects

In 1946, Parker opened his first consulting office. His first project was a 470-ft reinforced concrete viaduct across a deep ravine. The client was the City of St. Thomas, Ontario. Bridge design always has played a major part in Parker's firms (they have made more than 300 bridge studies and completed design and supervision of more than 200 bridges).

A current project of Parker's organization is the Burlington Canal vertical lift bridge – a 370-ft railway-highway span with two towers of sufficient height to permit 120-ft clearance under the span when it is opened fully. A separate three-level building will house the bridge operator, the controls, switchgear, and auxiliary diesel power generating equipment. When completed, this bridge will be one of the first tower-drive vertical lift spans in Canada – the largest of its type on the continent, with a lift load of 2000 tons.

Another of Parker's more unusual projects is the Fort William Arena, in Fort William, Ontario. The roof construction of this ice arena is unique in Canada. The hollow, concrete rigid frames give a clear span of 262 feet. Because of unstable soil conditions, the foundation was built on wood piles with horizontal ties at footing level to take the whole horizontal reaction.

In addition to his business interests and his work with ACEC, Parker finds time to hold memberships in the Associations of Professional Engineers of Ontario and of Alberta, the Engineering Institute of Canada, the Highway Research Board, the American Concrete Institute, and the Prestressed Concrete Institute. ▲▲

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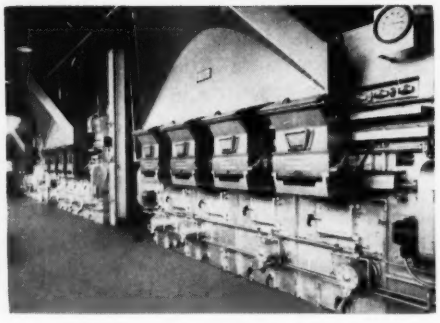
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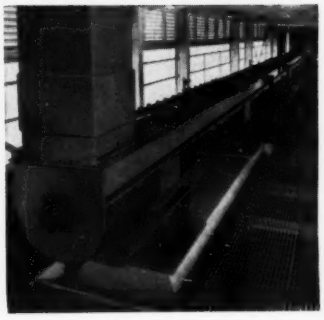




At delivery point, coal moves by belt conveyor to bucket elevator which carries it to roof of plant. Here reversible screw conveyor delivers coal either to 430-ton silo or coal bunkers inside plant. Conveyors and silo by Fairfield Engineering Co. Outside storage is under trestle at right.



Looking down firing aisle at three Babcock & Wilcox 75,000 lb/hr boilers. Coal is gravity fed from bunkers through Stock Equipment automatic scales and non-segregating distributors to 4-unit Detroit Rotostokers.



Over coal bunkers. Roof screw conveyor moves coal to chute (left). Coal is then dropped to screw conveyor shown and is carried to any of three 100-ton storage bunkers underneath.



Coal sets pattern for low-cost steam

Fabric finisher burns coal for economy and availability

Modernity is the keynote of the new plant of Carlisle Finishing Co., a division of Cone Mills Corporation, Carlisle, S.C. Advanced planning and up-to-date techniques are evident throughout the company's entire operation.

The power plant, too, reflects this thinking . . . *coal* is used to generate the steam required for heating and processing. Chosen for its economy and availability, coal is burned and handled automatically by the latest equipment for peak efficiency. Also, the interior of this plant—designed by the consulting firm of J. E. Sirrine Co., Greenville, S. C.—has been decorated in cheerful colors to match the cleanliness of operation.

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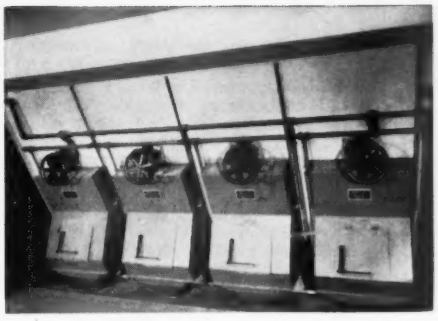
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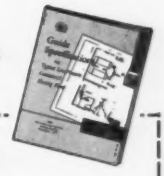
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The great reduction in moisture content of hygroscopic materials caused by dry air in the plant during the heating season drastically affects the qualities, dimensions, workability and weight of these materials.

Similarly, office efficiency is affected by dry air. Business machine operations in dry air can be a problem due to static electricity. Health and comfort of personnel is adversely affected by dry air.

The operation of certain types of production machinery, manufacture of explosives and flammable chemicals, plastic film handling, anesthetic areas in hospitals are subject to severe problems of static electricity under dry air conditions that may cause inefficiency and/or hazard.

The obvious answer is to specify automatic controlled humidification.

The use of dry steam is very often the simplest way to humidify.

Advantages of Steam Humidification

1. Steam is ready-made vapor which merely has to be mixed with air in the duct system or discharged to the humidified area.

2. Steam is pure water vapor—no mineral dust as comes from evaporated water droplets.

3. Steam may be shut off immediately when control is satisfied.

4. Steam comes on immediately when control calls for humidity.

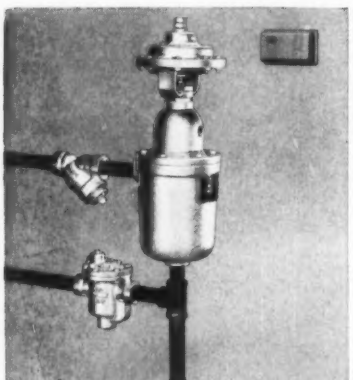
5. Duct system and air handling units are always dry. Thus, there is no odor, no growth of algae or bacteria, no corrosion problems.

Armstrong Steam Humidifiers are scientifically designed, automatically controlled steam valves for admitting steam vapor to the humidified area, either directly or into the air stream in ducts or plenums. The humidifiers dry the steam and muffle the noise of the discharge.

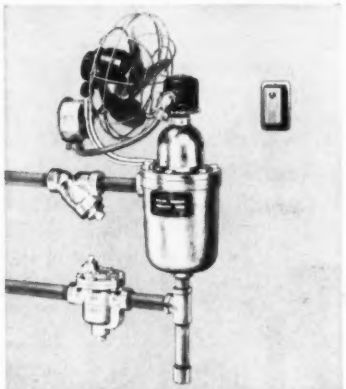
Thousands of Armstrong units are used successfully in industries working with hygroscopic materials, in offices, plants and institutions for improving health and comfort conditions and in offices, plants and institutions for control of static electricity. Every installation is backed by a sales and service network that blankets the United States and Canada.

Advantages of Armstrong Humidifiers

1—Low cost and large capacity.
2—Minimum maintenance, proved by thousands of installations.
3—Quiet operation.
4—No carry-over or drip.
5—Immediate response to control.
6—Low operating expense.
7—Guaranteed tabulated capacities.
8—Selection is simple and easy.
9—Small space required makes duct design easy.
10—Easy installation.



AM-32 Air-Modulating Humidifier complete with strainer, trap and hygrostat. AM-33 similar.



CL-2 Humidifier complete with fan and motor, humidistat, fine mesh strainer and trap. CL-3 similar.

Models Available, List Prices, Capacity Range

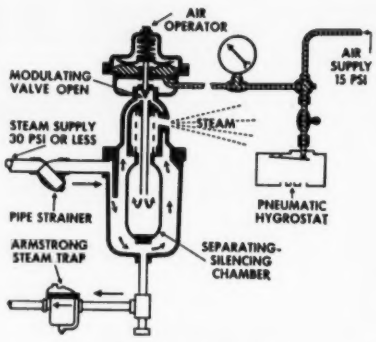
Air-Operated Units

Model	List Price	Capacity, lb/hr
AM-32	229.25	31 to 150
AM-33	316.00	60 to 320
DA-34	593.00	145 to 1425

Electric Units

Model	List Price	Capacity, lb/hr
CL-2	170.00	25 to 76
CL-3	295.00	60 to 170
CK-4	545.00	145 to 1280

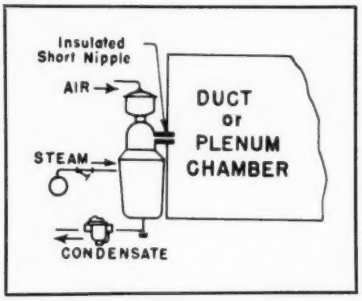
Models DA-34 and CK-4 are high capacity units for use with large floor type unit heaters or in large ducts or plenum chambers.



HOW THEY WORK

Air-Operated Units—When relative humidity drops slightly below desired level, the pneumatic hygrostat increases air pressure in operator to open modulating valve in proportion to demand. When demand is satisfied air bleed closes the valve. Air-operated units usually discharge to ducts or are installed in plenums.

Electric Units—When relative humidity drops slightly below desired level, humidistat energizes solenoid to open steam valve and start fan. Steam flows through muffler to atmosphere and is dispersed by fan. When desired humidity is reached, humidistat closes valve and stops fan. Electrically operated units normally discharge directly into atmosphere.



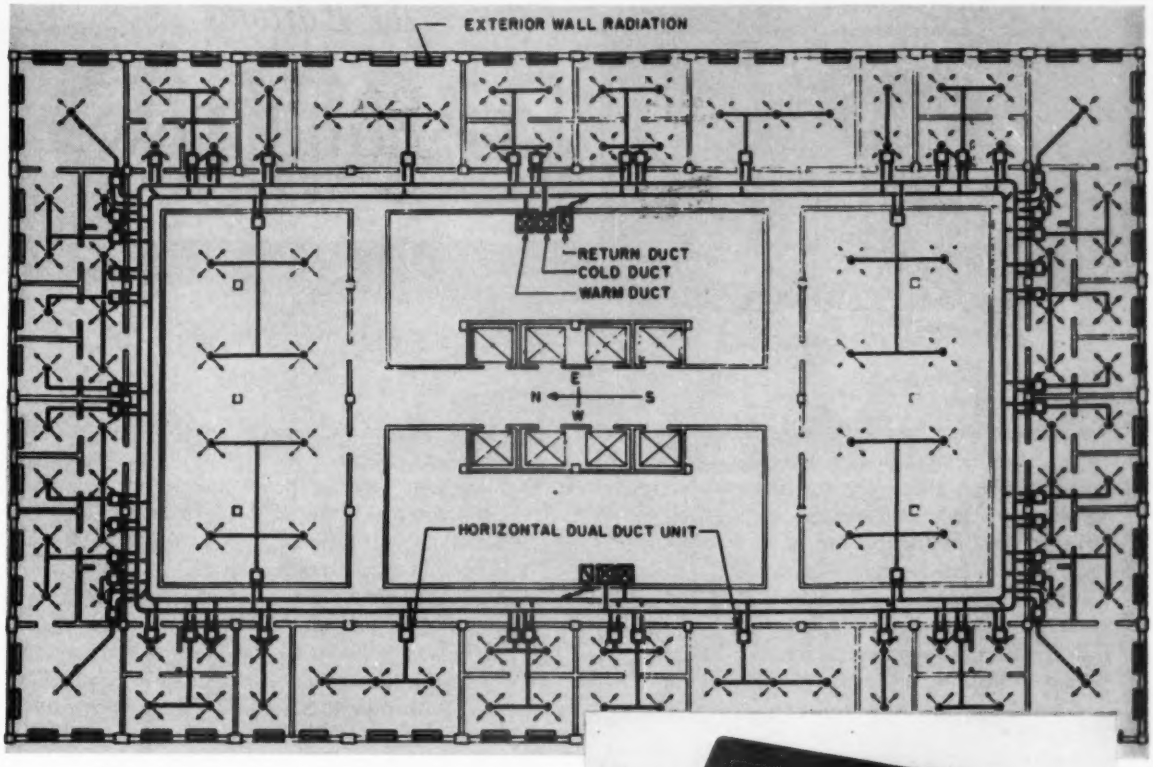
Typical installation of Armstrong Humidifier discharging dry steam to ventilating air duct.

For Complete Information

SIXTEEN-PAGE BULLETIN NO. 500 contains a wealth of information about humidification. Tells: how relative humidity affects products and profits . . . other effects of relative humidity . . . recommended humidities for various operations . . . advantages of Armstrong Steam Humidifiers . . . how present users have profited . . . complete data and prices on all Armstrong humidifiers . . . selection and installation data. To get your copy, just call your local Armstrong Representative or write

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Shown above is a typical office building Dual Duct layout with individual overhead mixing units in each zone for selective temperature control. Radiation at the exterior walls prevents undesirable down drafts in cold climates and provides heat during night and weekend operation (existing buildings with radiation systems are usually treated in this manner). Changes in mixing units and zone arrangements may readily be made without disturbing the main system. When equipped with pre-set volume regulators, no balancing of units is required on the job site.

Illustrated: Buensod Type H unit designed for overhead installation, generally above hung ceilings. The unit discharges quietly and may be connected to any standard diffuser or grille. Cutaway shows self-contained volume regulator in place.



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A simple, tent-shaped apparatus is the heart of this Buensod unit. It automatically maintains constant air quantity, regardless of static pressure variance on mixing valve inlet or outlet. The volume control is completely independent of any sensing instrument, complicated linkage arrangement or outside power source.

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From the Editor's

Tranquil Tower

Competition – Fair and Phony

THE INDEPENDENT ENGINEER in private practice has some strong competition. This comes from two directions. First, there are the manufacturers and their agents who do design engineering either "free," in return for the use of their products, or for a fee, low or legitimate. Second, there are the contractors or constructors who not only take the contract for construction but also do the engineering. Again, the engineering services may be purported to be free, or the builder may quote a low or a legitimate fee as he sees fit.

We, and most independent consulting engineers, feel that this would be a better world if manufacturers stuck to turning out the best possible products at the lowest prices; if contractors confined their activities to fulfilling their construction contracts; and if engineering design, specification, and supervision of construction were left to independent consulting engineers. It might be added that in such a Utopia, architects would stick to aesthetics and engineers to technology.

Meanwhile, what can the independent consulting engineer do to improve his competitive position? There are several possible approaches. Even a casual investigation by the consulting engineer associations or the NSPE Functional Groups would show that there is a considerable amount of engineering work being done by manufacturer's engineers and contractors who are not registered in the state in which their projects are located. These are simple cases to handle. Hire a lawyer and go to court. Such a case would have the support of not only private practitioners but all registered engineers.

While there is much illegal work of this type being done, most of the competition comes from agents or contractors who are registered engineers and are fully licensed to provide engineering services. Then, there is nothing the courts can do under our current state registration laws. There has been some talk about special licensing of consulting engineers so that only they would be permitted to offer their services to the public, but a lawyer will tell you that a law of this type soon would be declared unconstitutional by any court. It would be discriminatory class legislation.

If consulting engineers must accept the fact that they cannot, by law, eliminate competition by registered engineers who work as agents or contractors, how else can they go about it? Ethics are the usual answer. In turning to a code of ethics, the consulting engineer can find his firmest support in the items dealing with fees.

It is fair to say that most manufacturers' agents who provide engineering services for their clients either charge no fee or charge a very low fee for their design work. Manufacturers' agents who do this are guilty of unethical conduct under Item 8 of the ASCE Code of Ethics or Section 27 of the Canons of Ethics, for it is obvious that they are using a salaried position (or its equivalent) to make it possible for them to cut fees below the actual cost of the engineering work, thereby competing unfairly with engineers in private practice.

Since most registered engineers who are manufacturers' agents are members of a Founder Society, or NSPE, or both, any instance of an agent providing engineering services for nothing or for a ridiculously low fee could be taken before the Board of Ethical Review of his society – if anyone had the guts to do it.

This approach, however, would have no bearing on contractors who conceal all or part of the cost of engineering in their construction contract. None of the codes or canons have anything to say about that. It is true that several national societies and some group in almost every state have published fee schedules, but these are schedules of *recommended* minimum fees, and there is nothing in



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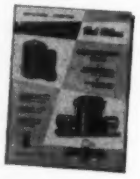
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either the law or the codes that makes it unethical to charge less than the schedules recommend. Therefore, there is nothing either illegal or unethical about concealment of engineering fees by a contractor. This is, at the moment, a problem without a solution.

Then, there are the manufacturers' agents and the contractors who offer their engineering services at full legitimate fees. This, the consulting engineer may not like, but he must recognize that it is perfectly legal and in no way in conflict with the current codes or canons of ethics. The only answer the independent consultant has to this is better engineering service and a convincing sales story. If the charge for engineering services is the same for work performed by the manufacturers' agent, the contractor, and the independent engineer, it is a poor consultant who cannot convince a client that independent design and specification and independent supervision of construction is to his advantage.

This being the situation, and our Utopia not yet in sight, consulting engineers and their associations should make every effort to encourage manufacturers' agents and contractors to quote full and fair fees for their engineering services. This is better than trying to run these people out of business by boycotts and black lists that are certainly unprofessional, probably unethical, and possibly illegal.

The Missouri Association of Consulting Engineers now is working on this problem of agent or contractor competition. A policy statement has been prepared (but not yet approved by the membership) which says that the Association opposes the concealment of engineering fees in nonengineering bids or the lumping of engineering and nonengineering costs in one quotation to the client. It is the Association's feeling that it may be able to get manufacturers and contractor associations to go along with this policy and thereby reduce or perhaps even eliminate "free" or concealed charges for engineering done by manufacturers' agents or constructors.

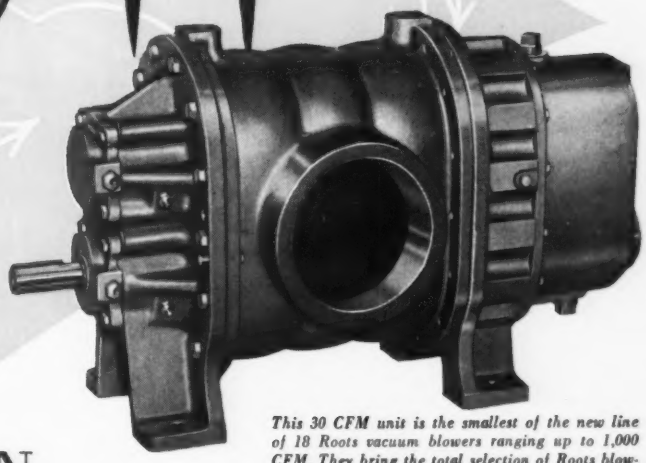
These policy statements do not have the force of law or even of a code of ethics, but the Missouri Association is to be congratulated on taking this approach rather than resorting to a boycott or a blacklist.

A similar policy statement is likely to be presented to the Consulting Engineers Council at its next board meeting, in Cincinnati, in November. If adopted, this will provide a possibility for national acceptance of this professional approach. It would be good, also, if the Founder Societies and NSPE would adopt policy statements specifically condemning the concealment of engineering fees in product prices or construction contracts.

The idea behind this is not to eliminate competition, but to eliminate unfair competition. ▲▲

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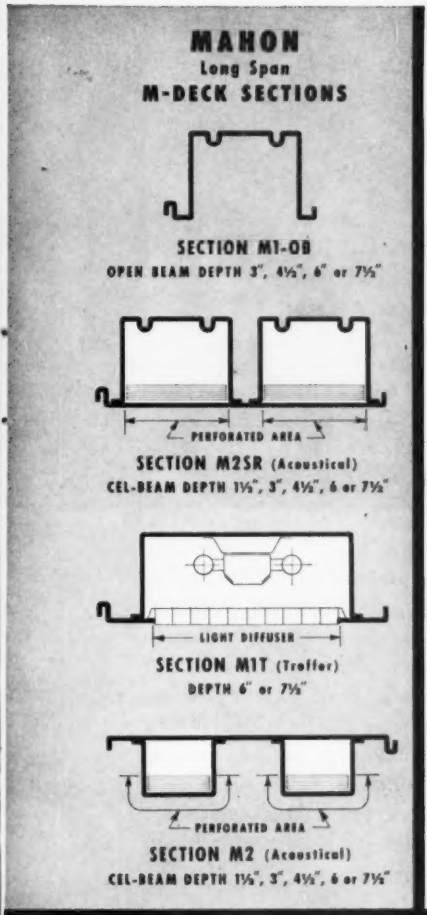


Entrance Foyer of Men's Intramural Building, Michigan State University, Lansing, Mich. The building houses Classrooms, Swimming Pool, and other Sports and Conditioning Facilities. 89,200 Sq. Ft. of Mahon Acoustical M-Deck was used in the construction of the Combined Roof-Ceiling. Mahon also Fabricated and Erected 830 Tons of Structural Steel for this project. Lewis J. Sarvis, Architect. Granger Brothers Inc., Gen. Contrs.

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At Left: Cross Section of Long Span M-Deck Combined Roof-Ceiling with Troffer Lighting.

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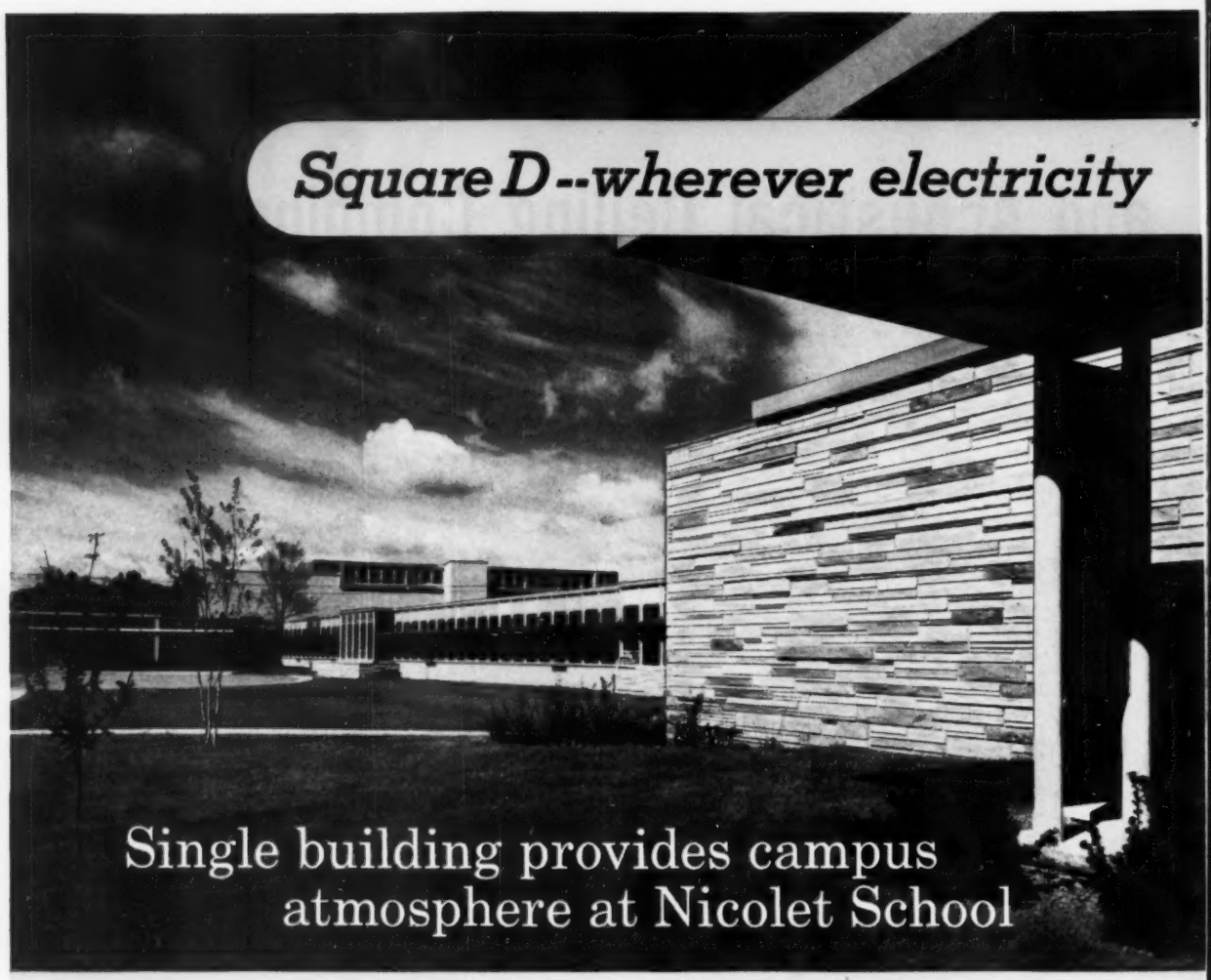
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Single building provides campus atmosphere at Nicolet School

NICOLET HIGH SCHOOL in suburban Milwaukee is "environment-controlled," achieving the open vistas of a campus with a single-unit building. Various school functions are located along the legs of an irregular "H"—an arrangement having no enclosed courts to interfere with the light, air and natural beauty of the 48-acre site. Horizontal aluminum sun shades and colored plastic louvres eliminate inside shades and venetian blinds—leave classroom views unobstructed.

School activities are grouped by related types, with athletic and shop facilities well removed from teaching areas. Isolation from highways and roads provides the environmental safety of a park. Community use is extensive. Swimming and many other recreational activities make Nicolet an important community center. *Square D electrical equipment is on duty throughout this impressive school plant...further evidence that you'll see the familiar* D *wherever electricity is distributed and controlled.*

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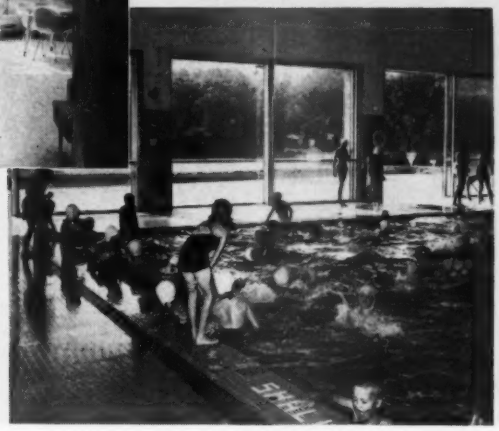
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ARCHITECT: *Office of von Grossmann, AIA*
CONSULTING ENGINEER: *Wanty and Associates*
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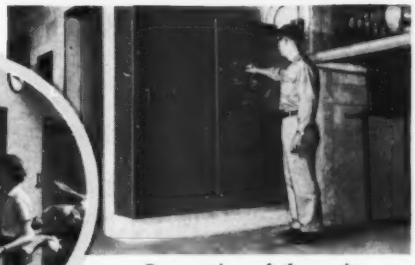
is distributed and controlled



There are no study halls in Nicolet • Instead, the Student Center (*left*) Library, Cafeteria and various classrooms are well located and equipped for study-hall purposes. With its adjoining outdoor terrace, the Student Center provides a quiet, relaxing atmosphere in keeping with the concept of a campus.



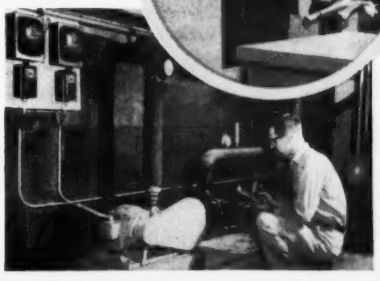
Indoor-outdoor swimming pool is on sunny side of building with adjacent sunbathing terrace. Window wall has double sliding glass doors with heated space between, adapts the pool to both summer and winter use.



One section of the main electrical distribution system utilizing Square D QMB panelboards



Typical Square D lighting panelboard of which there are many throughout the building



Square D switches and starters are used in the control of the various operating functions throughout the building

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LIMIT AND FOOT SWITCHES
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The Readers' Guide



Hospital Engineering

A Special Report

(page 99)

Most office buildings, churches, and schools are simple when compared to the modern general hospital. The contrast is even greater when the modern hospital is compared with its counterpart of a century ago. At the time of the civil war, the hospital was little more than a shed to cover the suffering. Even to enter the building was hazardous, for cross-contamination was so common that the patient was more likely to die of some other disease than the one for which he was entered. Surgery was an ordeal that only a doctor, or perhaps a patient, of the period could describe. Today, both staff and patients fare better. Nearly every new hospital is fully air conditioned. Food facilities are superior to those of most fine restaurants. Electrical supply, distribution, and application is the most reliable and safest that can be provided. While nurses and doctors are still essential, the patient can amuse himself during recovery with all manner of mechanical and electrical gadgets ranging from television to automatic window drapery controls. Doctors roam about with small radio receivers in their breast pockets, while nurses keep the head office informed of room occupancy and housekeeping conditions by means of push buttons and pneumatic tubes. Central control rooms are dominated by panels and boards clever enough to have been designed by pinball machine manufacturers, and families visit patients over closed circuit TV. This month, in a special section, CONSULTING ENGINEER gives readers a chance to find out about some of the problems and a great many opportunities in modern hospital engineering.

How the Germans

Go About It

(page 123)

Individually, the consulting engineers of Germany are more like the engineers of the United States than those of any other country. The industrialist of Germany has had a strong tendency toward cartel arrangements – certainly until the last war – but the German engineer in private practice always has been an independent soul working through a small or medium size office. When it comes to societies and organizations, the German mind would not put up with the confusion of societies we have here. Germans like things neat. But their society structure is still a little complicated. They have an association known as VBI, that resembles our Consulting Engineers Council in many ways. They also have *Gemeinschaft*, with consulting engineer firms rather than individuals as members. Anyone interested in association affairs in this country can learn a lot from the article "German Consultants – Engineers of a New Germany." The report was prepared by Dr. Thomas Hughes, an engineer and a historian, who spent last year in Munich on a Fulbright, studying the history of electrical engineering and German consulting engineers.

"De architectura"

(page 130)

Our author, James Kip Finch, Dean Emeritus of Engineering at Columbia, says in his article this month, ". . . if asked to name the book which has played a major role in the development of the engineering profession, the honor must go to *De architectura*, by Vitruvius:" The consulting engineer should not be mislead by the title. The Roman *architectus* was a designer and supervisor of construction not only of buildings but of machines. He was an engineer-architect. Vitruvius paid more attention to structural and mechanical engineering and construction methods than he did to aesthetics. Of the great books of engineering so far discussed by Dean Finch in his series for CONSULTING ENGINEER, this is the first that is available in a modern, reasonably priced edition. If the samples of Vitruvius fascinate you, it is likely you will want a full text for your library. A two volume edition ($3.00 each) is available from the Harvard University Press, Cambridge, Massachusetts. This edition is printed with Latin on one page and English on the next, if anyone wants to try his own translation.

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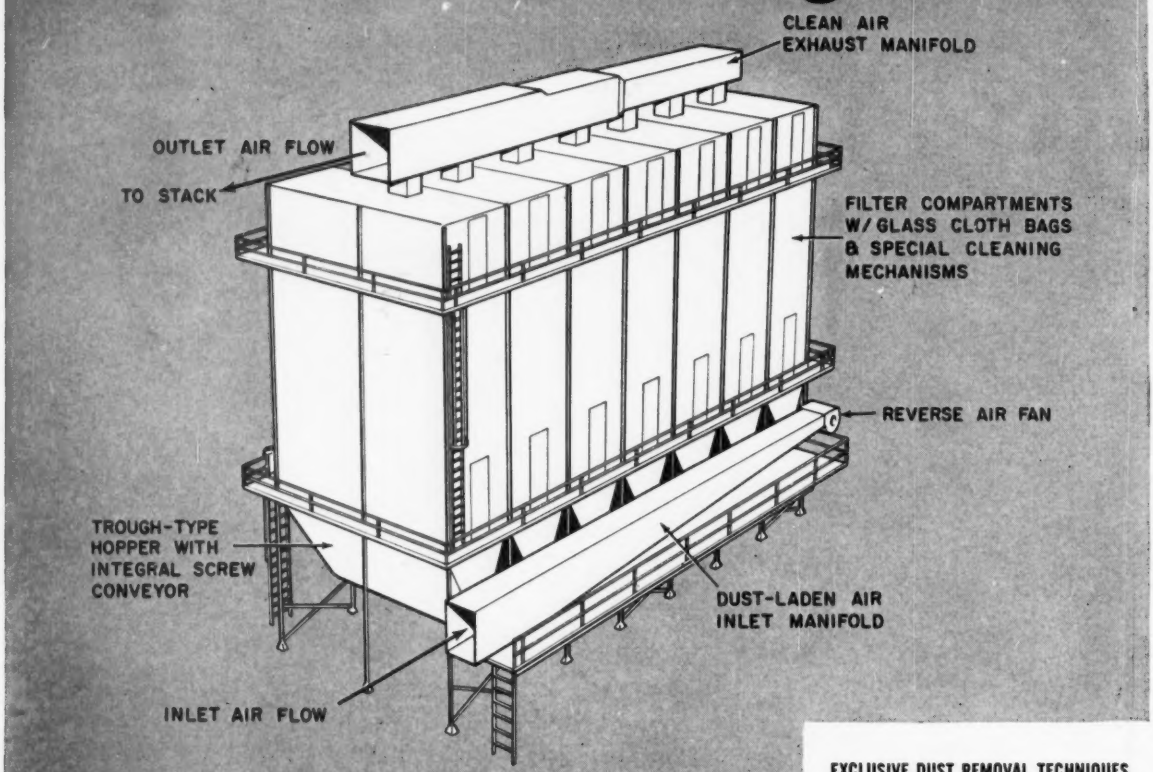
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Thompson, Sr. V.P. "We get top working efficiency at the lowest possible operating costs. And we get further savings because our Arkla-Servel unit is installed on the roof – utilizing otherwise useless space – and requires practically no maintenance."

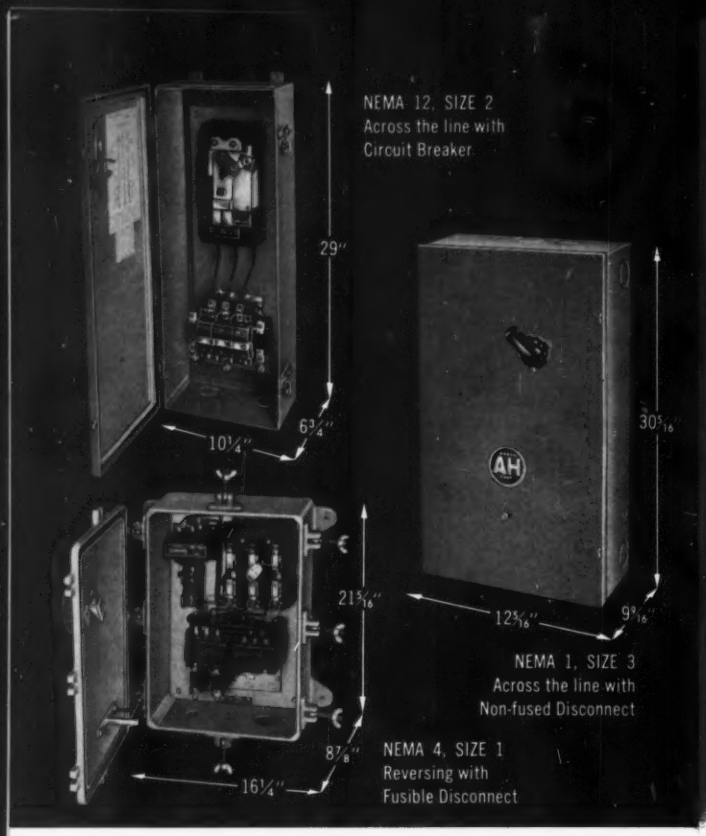
Check the facts and you too will see that modern Gas air conditioning out-performs all others. For specific details call your local Gas Company's air conditioning specialist, or write to the Arkla Air Conditioning Corporation, General Sales Office, 812 Main Street, Little Rock, Ark. *American Gas Association.*



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Simple Solution?

Sir:

It is gratifying to see that an editor of a professional engineering magazine is willing to discuss Canons and Codes of Ethics of the engineering societies. ("Tranquil Tower," August 1959.)

Perhaps you would be interested in the way a group of Kansas engineers have solved (?) our ethics problems.

The Ethics Committee requires a written complaint. The action of the Committee is put to the group at a general assembly for discussion. The complaint is then voted upon. Those who are guilty vote "ethical" and those who are not guilty vote "not ethical." The majority governs. It is that simple!

K. E. Rector
K. E. Rector & Associates
Topeka, Kansas

Firsthand Knowledge

Sir:

I should like to comment on John Ashton's excellent article about consulting behind the Iron Curtain. As a consultant in one of the large governmental consulting bureaus in Budapest, I practiced "behind the Iron Curtain" from 1949 to 1956, when I fled Hungary following the famous uprising.

The Hungarian Engineers Guild was supplanted in 1945 by the Trade Union of Engineers and

Readers' Comment

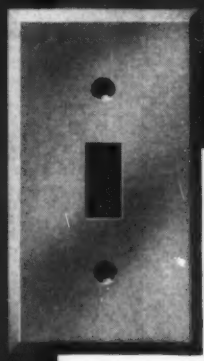
Technicians, and later, this union by the National Association of Construction Workers (union). Two other societies, the Society of Building Sciences and another organizing heavy construction, also currently exist. These societies are predominantly interested in the free exchange of technical information. Consulting engineers, as such, have no organization at this time.

Consulting engineering is carried on in huge government agencies comparable in size to many private companies in this country. Employing from 100-1000 people, these agencies are strictly business enterprises, show profit, pay taxes, and work on a contract basis with other governmental agencies and companies. Fees for consulting services on large architectural projects are about 1 to 1.5 percent of estimated construction cost. Deadlines are rigorously observed, and special courts – set up to deal with unsatisfactory performance – have power to impose fines. The rulings of such courts, however, are frequently appealed.

Although these government agencies show the influence of party organization and political appointees – the triumvirate in charge being the executive director, personnel manager, and party secretary – former consulting engineers generally play a prominent role, and engineers as a group enjoy a comparatively high-salary benefit and pleasant working conditions. Engineering services are much in demand, new ideas (brainstorming) and young engineers are encouraged, and foreign literature is, at

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least in a limited way, made available. Office meetings are held regularly, and criticism of technical and business matters may be offered by all members of the agency – although not necessarily attended by management. For all the neighboring influence, Hungarian engineering practice leans heavily on Western standards, Russian technology being of little help.

And finally, the creativeness of Hungarian engineers is challenged by scarcity of material (steel, timber), shortage of labor force, unrealistic time schedules under political pressures, and other blunders outside the domain of engineering.

Denis Gellert
New York, New York

Hiring College Graduates

Sir:

The article "Get the Graduate That Fits the Firm," by Chester W. Lyon, raises the interesting question of whether college grades are a good recruiting criterion for a consulting engineering firm. In hiring new electrical engineering graduates I have wondered the same thing.

About a year ago I decided to try to see whether our own experience might furnish an answer. For J&M's electrical engineers, is there a good correlation between success with us and either college academic standing or extent of participation in college extracurricular activities?

We took as a sample 18 graduates working as engineers in the electrical division. We excluded graduates working in the design organization, those less than three years out of college, and electrical engineering graduates who are division heads, project managers, or in management.

As the measure of success we took the relationship between age and salary.

The end result was the correlation of relative success against: (a) academic position of each man in his graduating class of electrical engineers, and (b) activities position in his class (as reported by the man in an interview for the purpose of this study).

To our great surprise we found a very slight correlation with activities and none with grades.

We do not take this little statistical exercise very seriously, and I suggest the same attitude to the reader, for several reasons. The sample was small. It did not include the firm's top men. Colleges vary – a third-quartile man from MIT may be better than a first-quartile man from Podunk College.

So what do we use as a recruiting criterion for electrical graduates? Our basic idea is that we are recruiting potential Chiefs, not potential Indians. Mr. Lyon's third type is about this man. We consider that we can get Indians when we need them. Indeed, some of the potential Chiefs we recruit at colleges will later turn out to be Indians. A college graduate needs so much training before he begins to pay off that it seems foolish to put this time and money into anything but the best you can get. So we set our sights high, and judge men on attitude, interest, and the intangible factors of personality. Usually the man we want is in the top third of his class, because these other attributes also have made him a good student.

J. C. Hitt
Jackson & Moreland, Inc.
Boston, Massachusetts

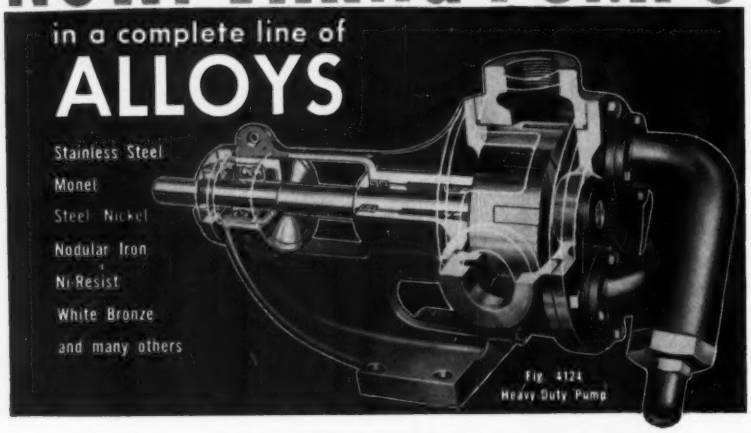
Education As the Dean Sees It

Sir:

I have just had a chance to look at the August issue of CONSULTING ENGINEER. There are two articles that I have read with great care: the cover story on Adolph J. Ackerman, and the article on the editor's trip through Europe.

This European trip must have been a fascinating one. This is evident in almost every line. You have managed to introduce interest and enthusiasm all through the article, and I thoroughly enjoyed reading it. I was particularly interested in

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the sketches which helped bring the entire trip to life.

In reading the article about Mr. Ackerman, I was particularly impressed with his statement that, "Colleges today are turning out technicians, not engineers." As a solution to this he strongly advocates a five-year engineering degree with the additional time devoted to the humanities.

I am afraid that I do not agree with Mr. Ackerman for I think that there is more emphasis on humanities in our present day engineering curricula than there has ever been before. I agree that a five-year engineering degree program is highly favorable, but it is extremely impractical at the present time. Very few institutions will be able to offer such a program unless the majority of the tax supported schools do.

There is some question in my mind as to whether increased emphasis on the humanities is the answer to the problem of a broad education. I do not believe that interest in the humanities or in social studies such as history is all a matter of formal education. In looking back at Mr. Ackerman's comments, I am wondering whether his statement concerning the present day lack of training in the humanities and in social studies might not be based upon his own lack of this type of training. Many of the things that he feels should be part of the education of a modern engineer apparently were not a part of his own education. There is no question that he has acquired this breadth, this knowledge, and this understanding, but – and this is the question – can this be acquired by a formal education? Isn't it necessary that we in education develop a desire on the part of the student to continue his education in these areas after he leaves school – just as Mr. Ackerman did? And if this desire is not present, even in a latent form, will the student ever be more than a technician?

The same thing could be said of the practicing attorney, of the physician, of the scientist – yes, even of the theologian. The area of thought of these professional men can be just as rigid and as narrow as that of the technician and the engineer. Perhaps specialization is the curse of our age even though we will all admit it is one of the blessings.

H. C. Hesse, Dean
College of Engineering
Valparaiso University
Valparaiso, Indiana

Aid for Common Problems

Sir:

I have read your issue of CONSULTING ENGINEER for July 1959 with interest, particularly your personality column regarding John Clarkeson.

The paragraphs in this article dealing with the Hoover Commission Task Force Reports and Mr. Clarkeson's comments thereon appear to me to have great value. I should be most grateful if you would be good enough to order a copy of the Hoover Commission Task Force Report from the publishers and ask them to send it to me, together with their charges, as I think this will be of great help in some arguments we are having over here.

Col. C.W.G. Walker, Secretary
The Association of Consulting Engineers (Incorporated)
London, England

File Completed

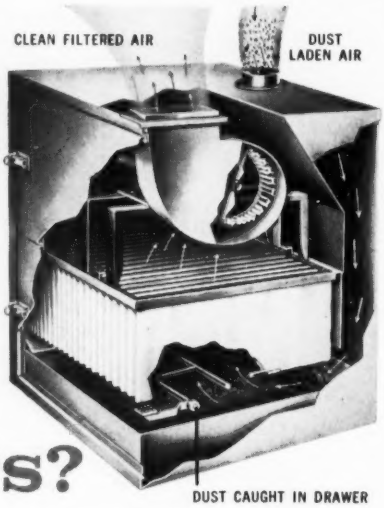
Sir:

I have received your beautiful and interesting magazine, CONSULTING ENGINEER (April, June, and July 1959). It is so valuable that I should like to receive the copies of the January, February, March, and May issues in order that I may have in my library the complete collection of CONSULTING ENGINEER for the year.

Prof. Ing. P. G. Liegeois
Vice President, Chamber of Consulting Engineers of Belgium
Liege, Belgium

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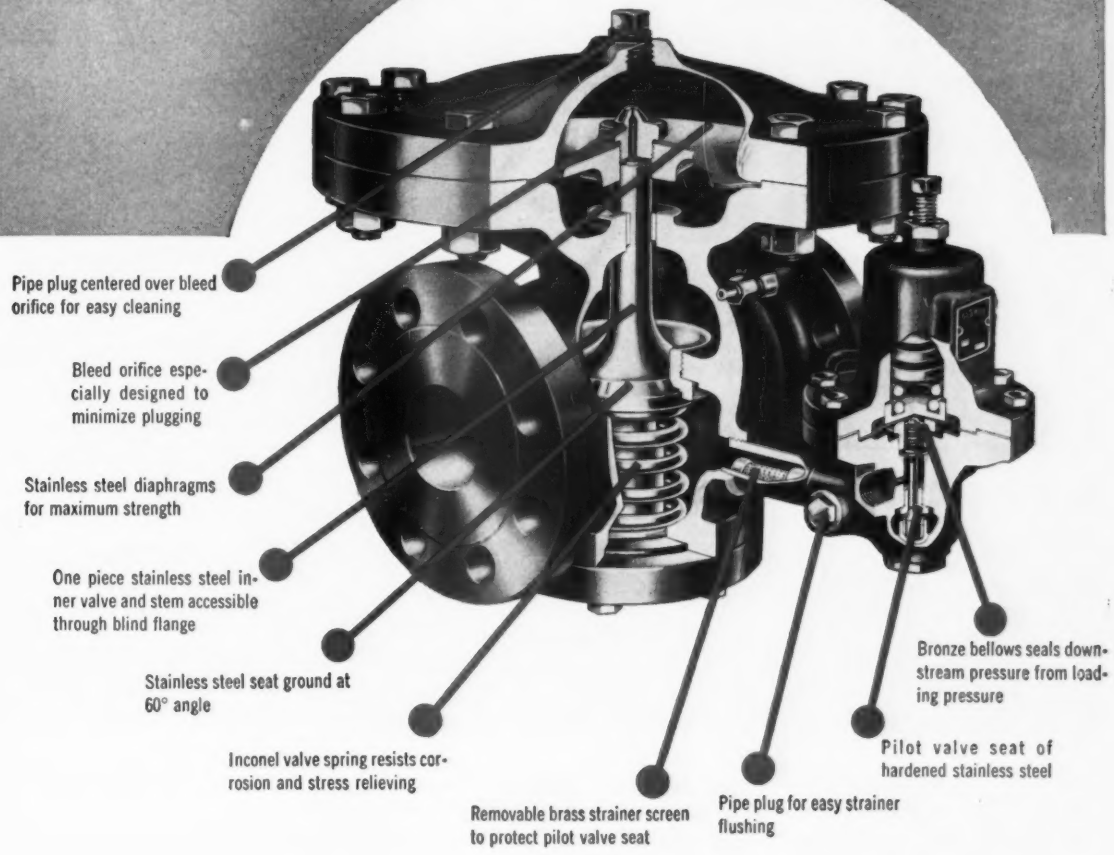
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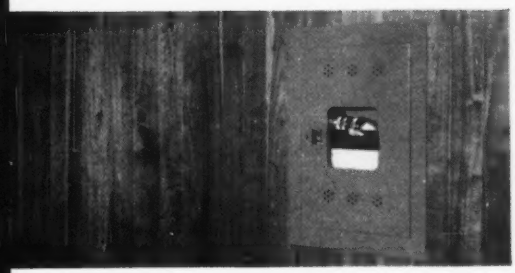
and the hose can't snag when it's needed most. The new Allenco Hozegard cabinet is the first fire hose cabinet equipment to be *completely* Underwriters listed! Each Hozegard installation saves 25% to 30% by eliminating the expensive pin-type rack and the time needed to install the hose on it.

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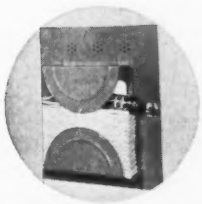
FOUL-PROOF door rack



NOTE TO THE DESIGNER

You'll appreciate the contemporary styling of Allenco Hozegard cabinets. Designed to complement interior decor, they actually blend with the beauty of your building.

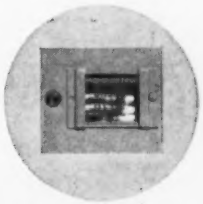
Requiring 35% less area—less depth, the compact Hozegard cabinet can be flush-mounted in any wall, or in the floor! The cabinet door is available in several styles and choice of 3 trims . . . custom-finished at the factory or on-the-job to your specifications.



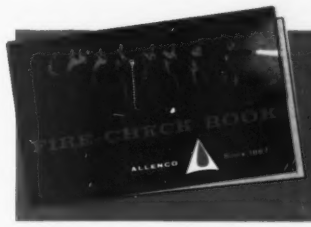
Free swinging door rack means foul-proof withdrawal and ready aiming at fire.



Exclusive hose clip makes cabinet semi-automatic—perfect for one-man operation.



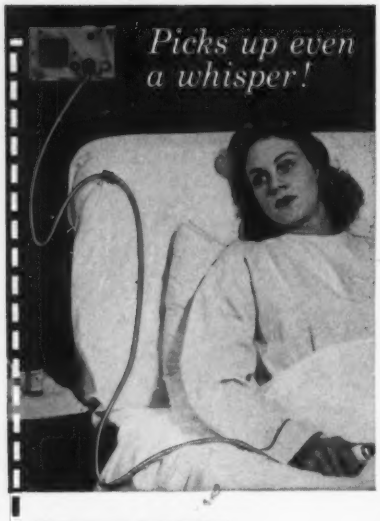
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The Legal Aspect

MELVIN NORD, P.E.
Consultant in Legal and Technical Problems
Patent Attorney

The Law of Real Property: Boundary Disputes

WHEN THE BOUNDARY LINE between adjoining landowners is in dispute, there are a number of ways of settling the dispute. The simplest way, assuming the parties can come to agreement, is for one or both parties to give a quitclaim deed to the other (perhaps for a predetermined consideration) covering the disputed area. Then there is no question of who owns what. Unfortunately, this is not what usually happens, and it is the alternatives that are of interest to consulting engineers.

Acquiescence

Despite the fact that land, in general, cannot be conveyed without a writing or deed, there is an exception in the case of boundary disputes. The rule is that an oral agreement to fix a boundary line is valid and binding provided:
¶ There was a bona fide dispute as to the location of the true boundary line between the properties.
¶ The parties subsequently have occupied to the agreed upon line.
¶ The parties have acquiesced in the fixing of the line and in occupying the land up to the line.

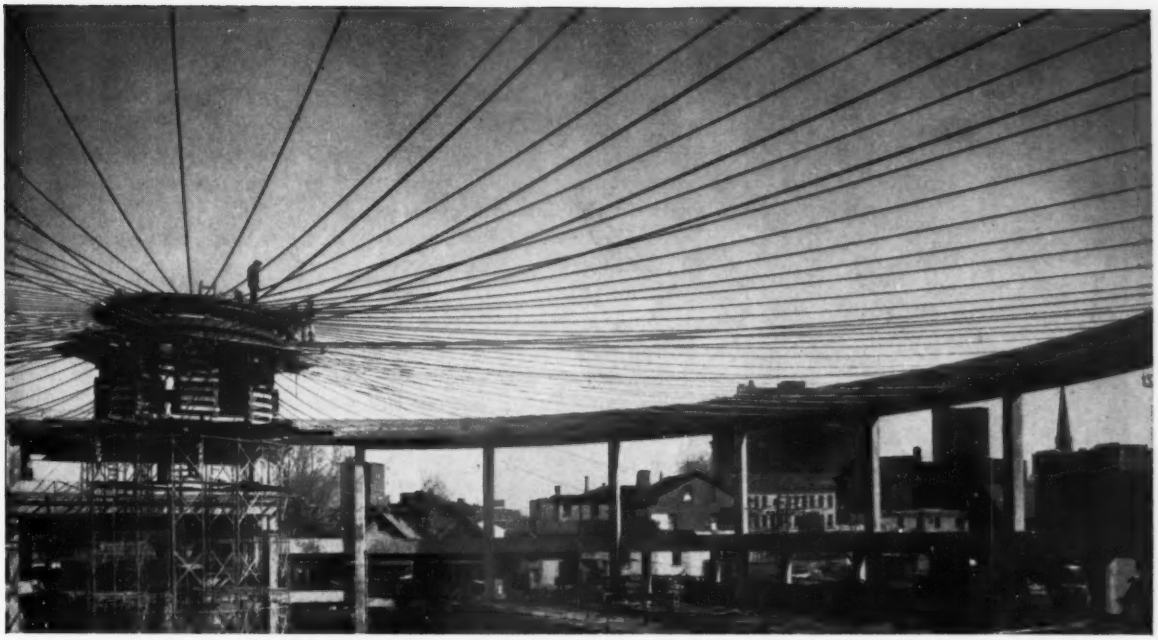
Two points are important under these conditions. First, it is clear that no deed or writing is required. It may be argued that the reason for this is because there is actually no conveyance of land, but merely a matter of construction by the parties of the descriptions in their own deeds. But it is really more than that, since some land actually is conveyed, whether the parties know it or not. In other words, this really is an exception to the Statute of Frauds requirement of a writing, even though no such exception appears in the Statute of Frauds! It is a judicial exception, based on the policy of favoring the settlement of disputes.

Not only is there no need for a writing, there even is no need for an express oral agreement, according to a minority of courts; the agreement can be implied from the actions of the parties. However, under the general rule, mere acquiescence is not sufficient without an express agreement (unless the parties have complied with the rules of adverse possession).

In the second place, it is not necessary, under the rule of acquiescence, for the occupation to have continued for the period of the Statute of Limitations – generally 20 years for land. Thus it is evident that the doctrine of acquiescence is not merely a branch of the law of adverse possession; it is actually an entirely separate rule.

Adverse Possession

In general, where there is no agreement, occupation and acquiescence can be effective to settle a boundary line only if the rules as to adverse possession are satisfied. Under the doctrine of adverse possession, the occupation must be open and notorious and under a



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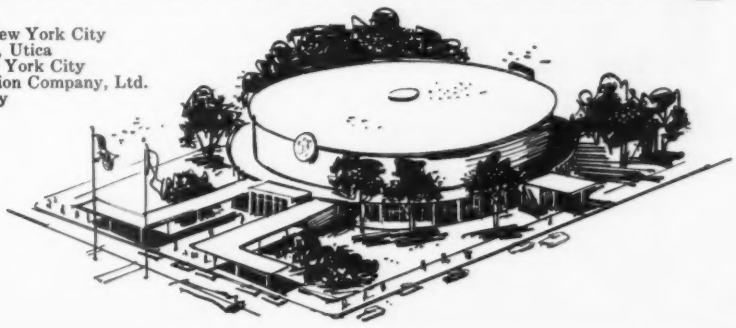
Aside from furnishing the 72 pairs of cables for the structure, Roebling's role included erection by means of a unique method. Sleeves were accurately placed in the outer concrete compression ring by the General Contractor and after the concrete had cured, an accurate survey was made of the location of all cable connections in the outer concrete ring. The roof cables were prestretched and accurately measured under theoretical dead load stress at the Roebling plant. Thus, the necessity of excessive adjustment on the end connectors and additional adjusting costs at the site were eliminated.

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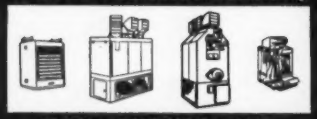
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claim of title, rather than being subservient to the rights of the other party. Furthermore, the occupation must continue uninterruptedly for the full period of the Statute of Limitations. This period, however, may be made up of several connected periods tacked onto each other, providing each occupier was in privity with the preceding one, i.e., claims to hold under the title of his predecessor.

Where there is no actual dispute as to the boundary line but one of the parties is uncertain as to its location and unilaterally occupies up to what he honestly believes is the true line, there is a conflict of authority among jurisdictions as to whether he ever can obtain title up to the new boundary if he in fact did not have it previously. It is clear that the rule of acquiescence is not applicable, since there has been no dispute and no agreement. Whether title can be acquired by adverse possession if the occupation continues for the full statutory period is the real problem.

Some courts have held that it cannot, since the occupier did not intend to claim title to the land in question unless he in fact owned it. In other words, they hold that his holding has not been hostile to that of the true owner. The acquiescence of the other party thus is viewed as simply giving the occupier a revocable license. A better view is that his holding is sufficiently adverse to permit him to get title by adverse possession, since he holds openly and notoriously and under a claim of title.

Estoppel

A boundary line also may be established by estoppel. If adjoining owners of land have had the boundary line thus established and made improvements on the land up to the boundary (or in view of the supposed location of the boundary), they are estopped subsequently from asserting that the boundary line was erroneous. The basis of this estoppel is that each has represented to the other that this is the true boundary line, and that each (or at least the party seeking to maintain such boundary line) has relied to his detriment on this understanding.

Whenever these two elements — representation and detrimental reliance — are present, the courts will find an estoppel. For example, if an owner of land disclaims title to land included within a disputed boundary, and permits another to purchase adjacent land in reliance on such disclaimer and to take possession of the land and occupy up to the supposed boundary, the actual owner is estopped to deny the accuracy of the new boundary line.

However, it should be noted that if an owner of land mistakenly builds over the boundary line, this is not sufficient to work an estoppel on the true owner, in the absence of a representation by him. In fact, he ordinarily can obtain a mandatory injunction requiring removal of the building overhang.

Judicial Proceedings

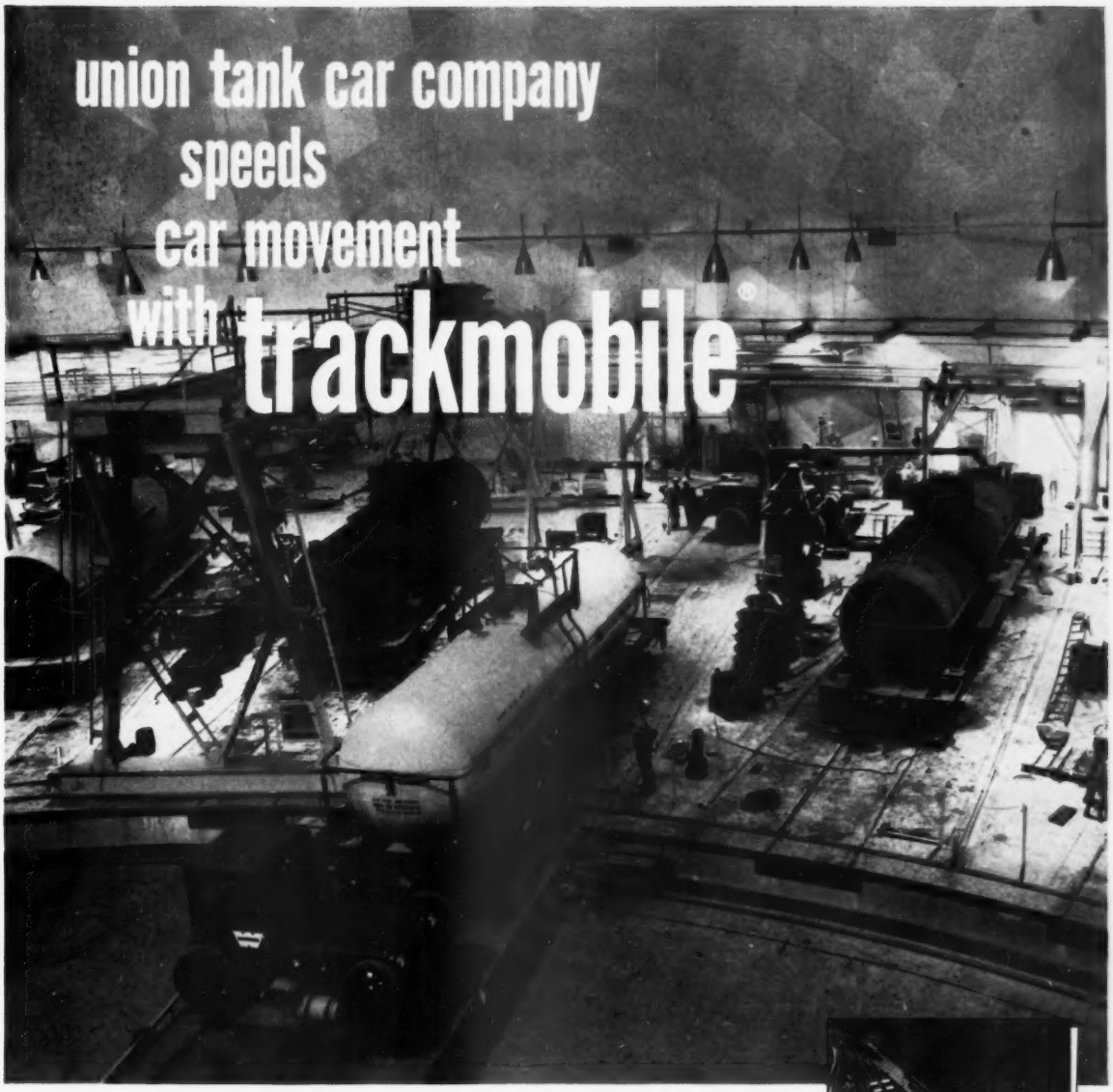
If all other means of settling a dispute over a boundary line fail, it can be settled by judicial proceedings at law. An action of ejectment or trespass will lie against the one who is allegedly unlawfully in possession of the disputed land.

Frequently, the location of the boundary line will be a question of fact for the jury. Thus, when the two people knowing the most about the location of the boundary line cannot settle the location themselves, it may be settled for them by 12 people having no personal knowledge of the facts. ▲▲

Expert Witness Reprint

Robin Beach's five articles on "The Engineer as an Expert Witness" are available in a 16-page reprint for $1.00. Please write to: Reader Service Dept., CONSULTING ENGINEER, 217 Wayne St., St. Joseph, Mich.

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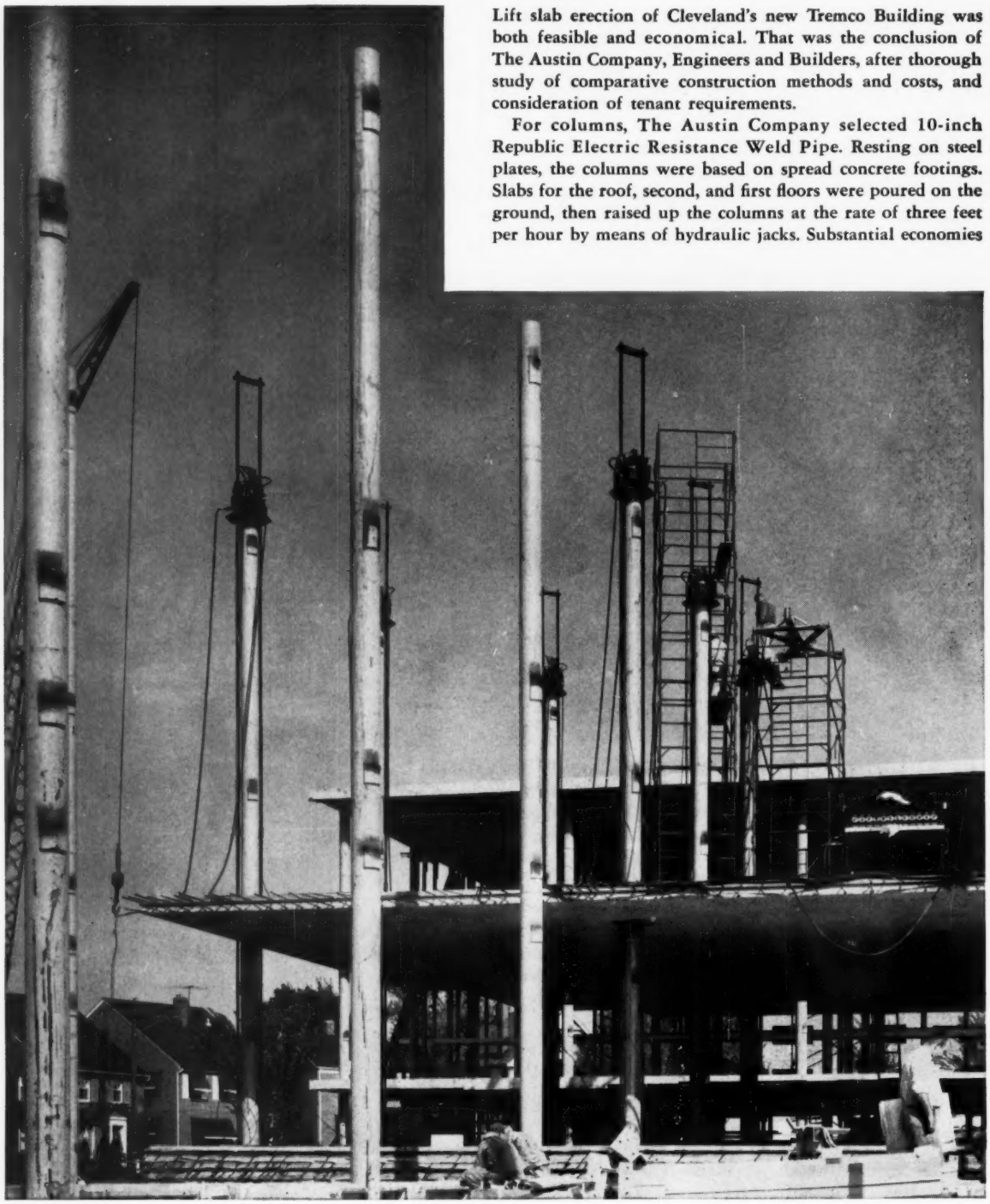
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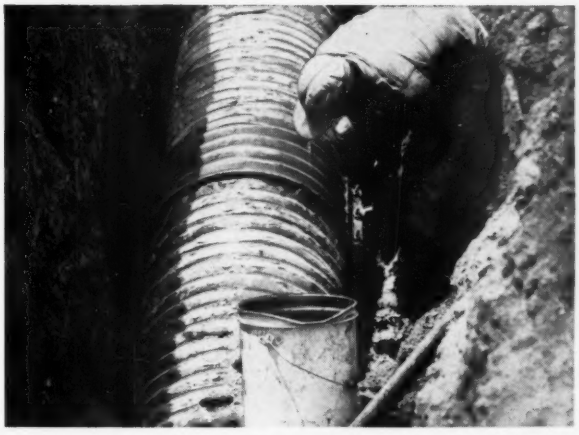
were realized by the elimination of wood forms and shores.

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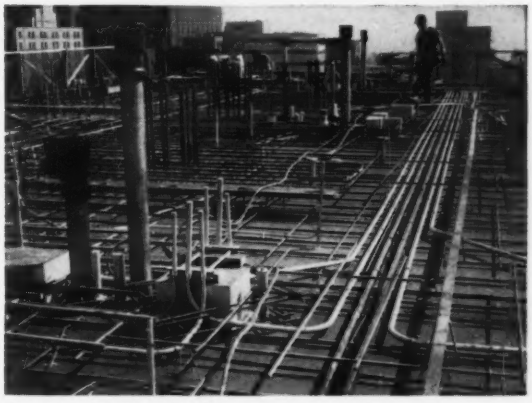
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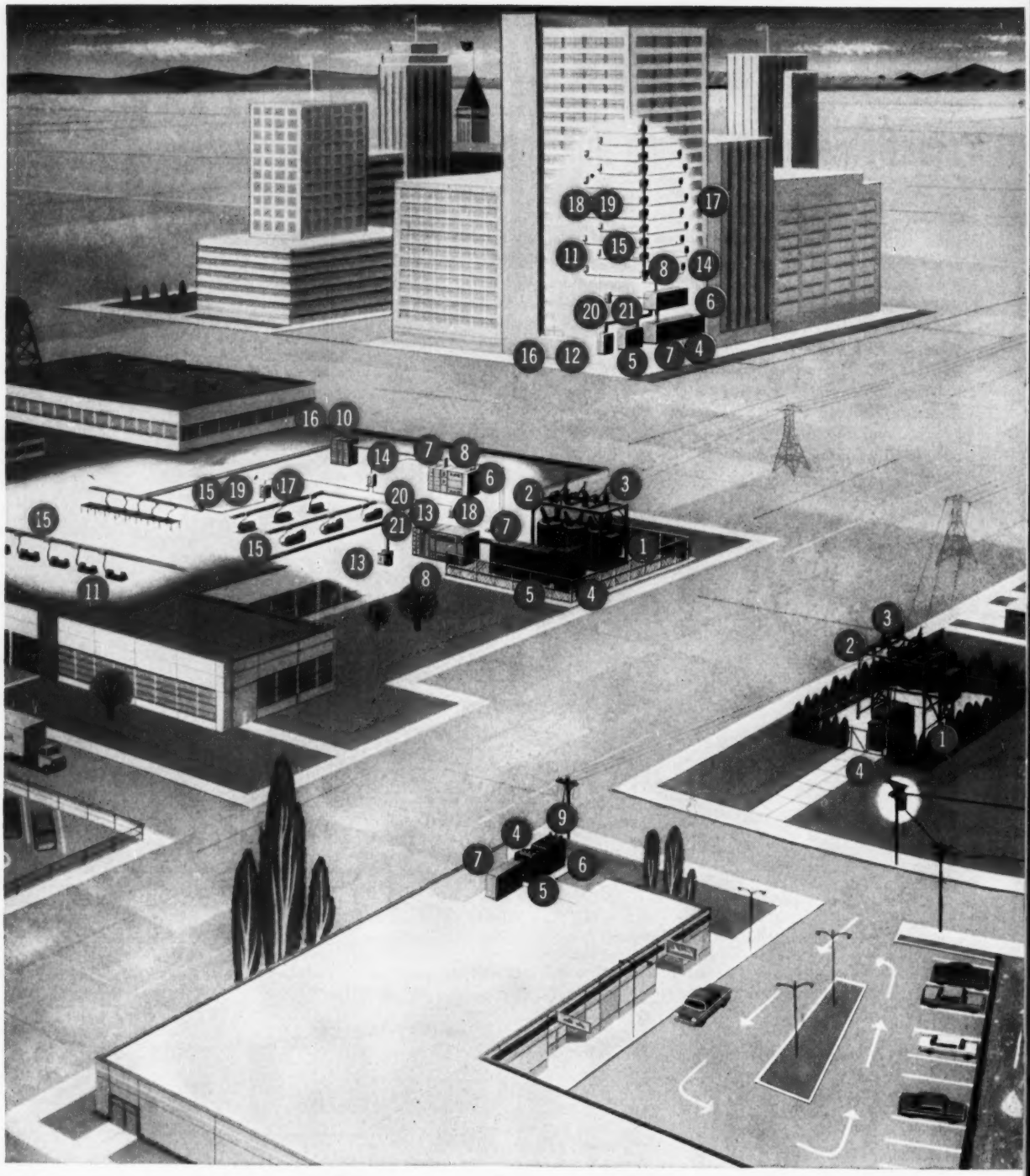
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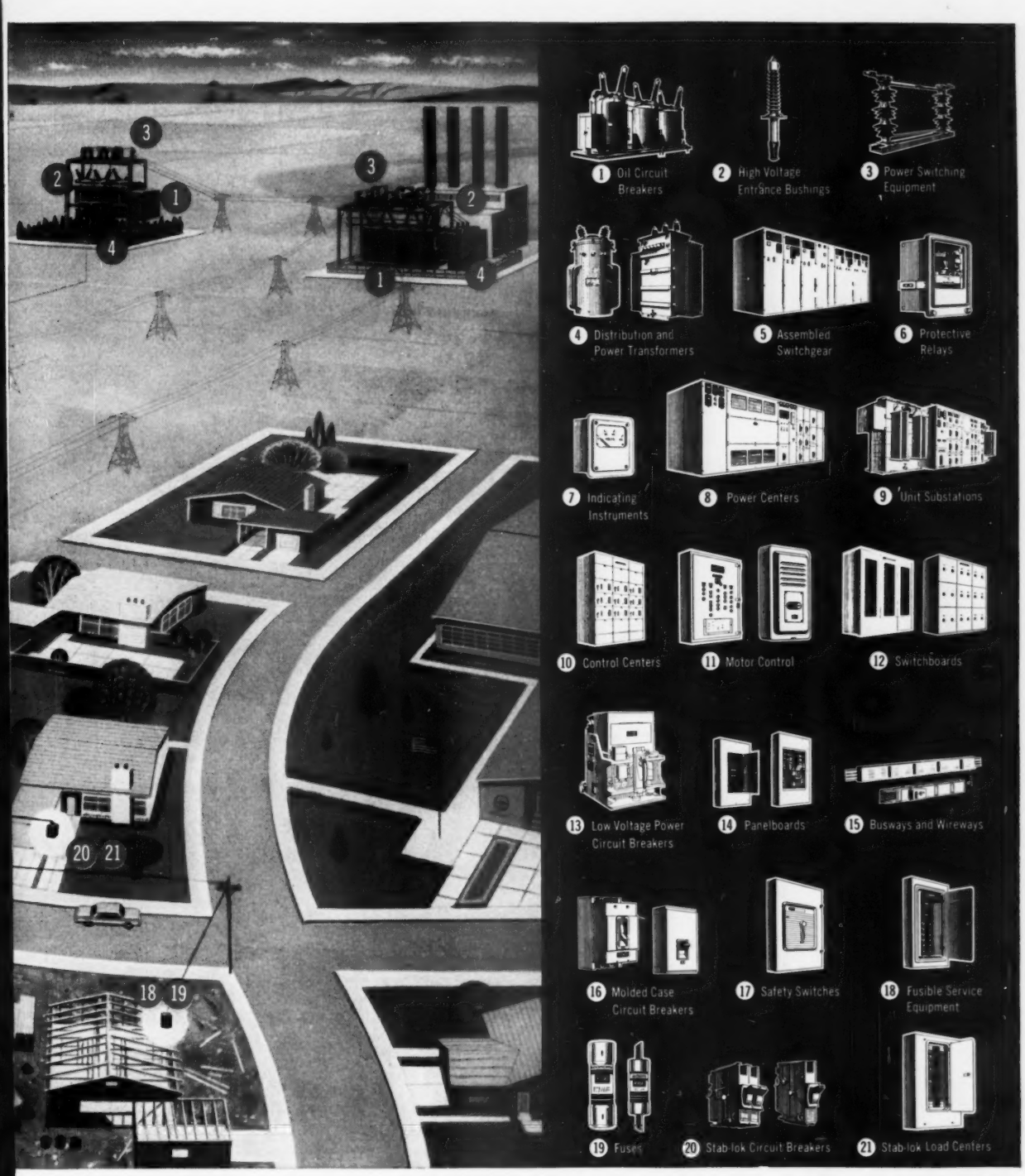
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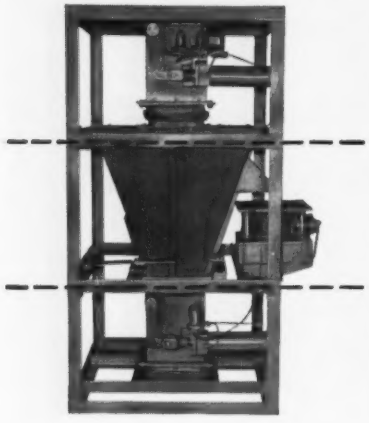
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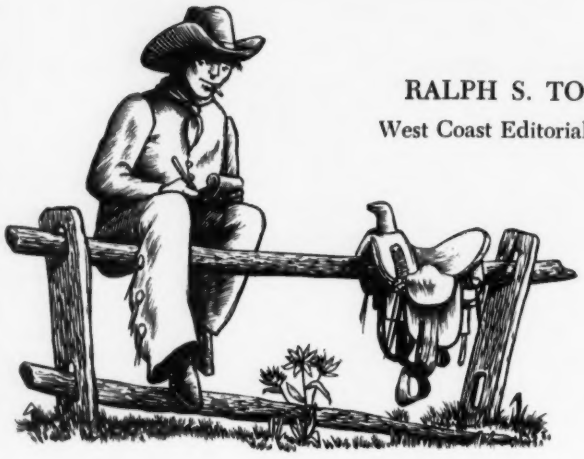
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RALPH S. TORGERSON
West Coast Editorial Representative

Report from the West Coast

ENGINEER-ARCHITECT relations on the West Coast have been improving in spite of some sporadic instances of fee disputes. Better relations have resulted because the architects and engineers have learned that more can be gained by working together than by aligning one profession against the other. This has been particularly true in matters involving legislation and in hearings before state, county, and city administrative bodies.

A/E Conference Committee

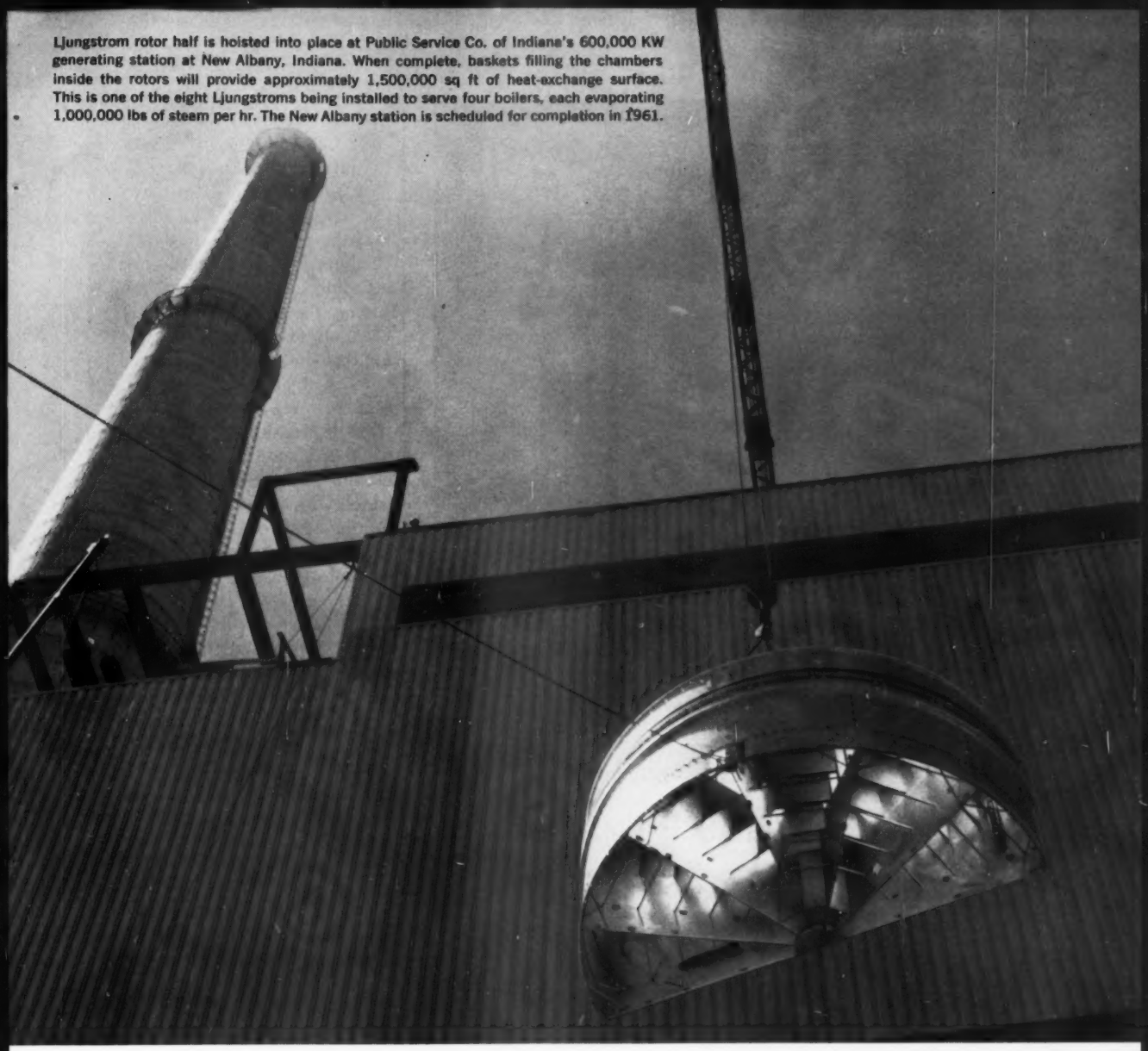
Much of this progress has accrued since the Architects and Engineers Conference Committee of California was set up two years ago. Participating members of the group include: the California Council, AIA; the Consulting Engineers Association of California; the Structural Engineers Association of California; the California Council of Civil Engineers and Land Surveyors; and more recently, the California Council of Landscape Architects.

Operating procedures set up for the Conference Committee are simple but effective. It has been agreed that to receive consideration a matter should be of statewide import and not capable of solution at a local or regional level; of mutual concern to both the architectural and engineering professions in California; and should be officially proposed to the Conference Committee by the executive board of directors of at least one of its constituent organizations.

The Conference Committee is not empowered to make policy decisions. This is considered the prerogative of its member associations. However, it does formulate and recommend plans for cooperative action by the professions. Each delegate then presents them to his constituent organization for approval. As far as possible, all delegates are expected to serve continuously for several years so that continuity of the various projects may be maintained.

Professional Cooperation

Some very outstanding accomplishments have been recorded by the group since its organization, but of even greater importance is the more friendly and cooperative relations that have grown up between the respective engineering groups and the architects. Melton Ferris, executive secretary of the



Ljungstrom rotor half is hoisted into place at Public Service Co. of Indiana's 600,000 KW generating station at New Albany, Indiana. When complete, baskets filling the chambers inside the rotors will provide approximately 1,500,000 sq ft of heat-exchange surface. This is one of the eight Ljungstroms being installed to serve four boilers, each evaporating 1,000,000 lbs of steam per hr. The New Albany station is scheduled for completion in 1961.

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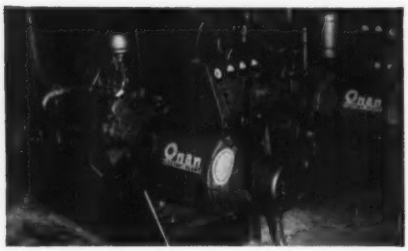


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Onan ELECTRIC PLANTS

Architects and Engineers Conference Committee, and also executive director, California Council, AIA, sums up the situation with this comment. "I personally feel that the establishment of the A/E Conference Committee in California points the way toward unity among the design professions. It was only five years ago in California that the groups now consulting on a regular basis were fighting each other in public before the state legislature. The atmosphere of understanding and willingness to talk over points of divergence which now prevails in the A/E Conference Committee is a most healthy one and I feel sure will continue to develop in this state."

Activities

A task force, with Henry Powers serving as chairman, currently is working on proposed architect-engineer forms of agreement. It is expected that another year may be required before drafts of a standard form will be ready to send to the constituent organizations for approval. The length of time required to agree on the terms of the form have been due to many divergences of individual practice and viewpoint. There also are divergences in practice between the northern and the southern parts of the state.

The Conference Committee also took an active part in helping to set up the California Council of Construction Inspectors and in arranging liaison with this newly formed body to establish state-wide standards of inspection. Plans now are being made to form a statewide coordinating committee on mechanical and electrical inspection of schools. The California Council, AIA, will soon issue a revised School Inspectors' Manual to which has been added sections covering mechanical and electrical work recommended by the Conference Committee.

It has been recommended by the Conference Committee that an

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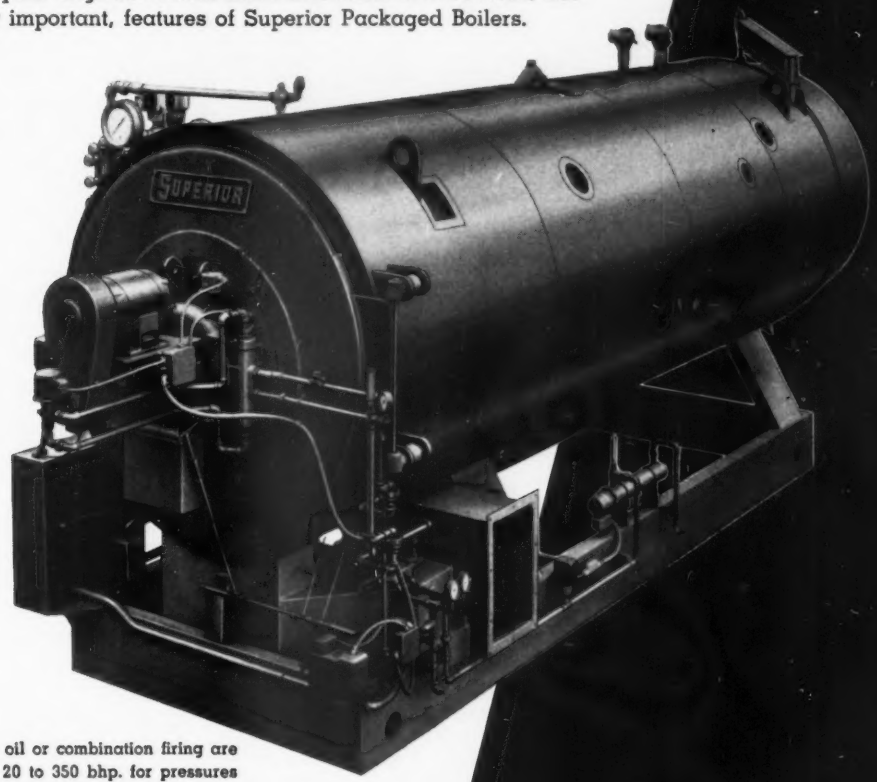
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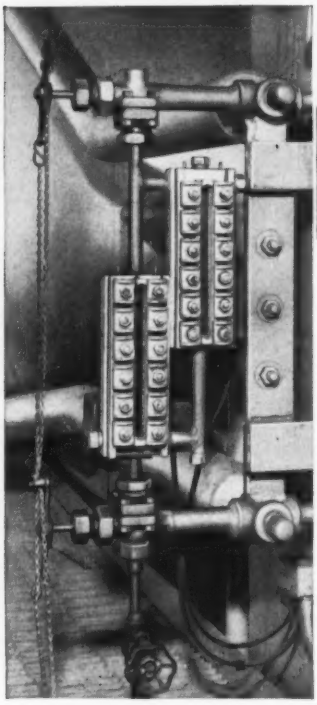
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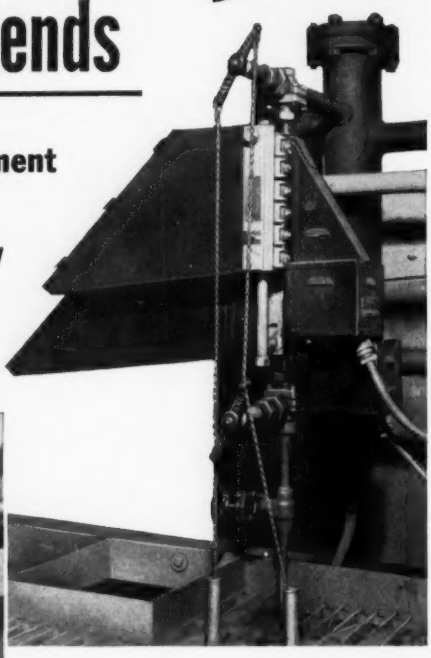
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architect, engineer, and contractor be added to the State Fire Advisory Board. So many decisions of this body affect the work of the design professions that it was felt they should be represented. The State Fire Marshall has agreed to such enlargement of the Board, but legislative action would be necessary to implement the proposed changes.

The Conference Committee also is proposing legislation to establish the Title 21 Advisory Board, which considers cases involving rulings on methods of construction and design, as a Board of Appeals. At present the Board only can advise but cannot make its findings binding if the California Division of Architecture overrules it.

Fee Problems

One problem that has caused some strain in engineer-architect relations is the question of adequate fees. Engineers have contended that in some instances architects have obtained jobs at fees that do not result in profitable operations for structural, mechanical, and electrical engineers who are asked to do work at reduced fees to make up the error of the architect. The obvious answer is that engineers should not take jobs at inadequate fees. However, engineers who have been caught in the squeeze know that it is not easy to turn down jobs from architects who have been giving them profitable work.

Sheldon Swickard, of Swickard and Escher, Los Angeles, in an analysis of the fee situation as it affects electrical engineers, found:

¶ A tendency toward lower fees, particularly on private and certain government work.

¶ An increasing financial burden is being placed upon the consulting engineer for costs that the architect formerly paid.

¶ Fees are based upon the subcontractor's bid instead of the segregated portion of the general contractor's work. On many projects, this gives the architect a 10 to 15 percent override in addition to his



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share of the over-all fee on the electrical portion.

Swickard said that these situations prevailed because there is a lack of an accepted fee policy for engineering work; there is no clear understanding of standards of basic services to be provided by the engineer; and no one knows exactly what the fee is a percentage of.

He further explained in his report to CEAC that the fee computation base has important significance. There is a difference of opinion among architects as to whether the fee basis should be the subcontractor bid price to the general contractor or the proportionate share of the general contract which is represented by a particular subcontractor's work. This can make a healthy difference in the engineer's fee. He suggested this is a point to be clarified in the formulation of the standard agreement between the architect and engineers. There should be an understanding with the architect as to the base to be used. At present, an architect may say he adheres to the 5 percent fee, but if the fee is based on the subcontractor's bid, it becomes in effect only about 4 or 4½ percent.

Oregon A/E Collaboration

Rowland S. Rosé, chairman of the Consulting Engineers Association of Oregon committee on collaboration with the architectural profession, reports that progress during the past two years has not been as rapid as hoped. Initial meetings between the architectural and consulting engineers' committees indicated that the structural engineering fee schedule was in need of revision. Based on this situation, the Structural Engineers Association of Oregon committee on consulting practice met and finally agreed on a revised schedule, which in turn was submitted to CEAO for inclusion in the newly released handbook of consulting practice.

Commenting on engineer-architect relations, Rosé said, "If I were to pin point the major conflict be-

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tween architects and engineers, it would be the reluctance or inability of the architects to raise their own fees, and to accept the fact that engineering fees must go up because of higher salaries, increased complexity of construction, and more detail in design required by this complexity.

"Experience with this combined committee indicates that it will take some time for a change to be realized – but change it must, and everything possible is being done to acquaint all practicing architects and engineers of these facts."

More Responsibilities

This committee also is engaged in:

¶ Study and recommendations for revision of the City of Portland's Bureau of Buildings procedures, in an effort to speed up the issuance of building permits.

¶ Coordination and cooperation with the State of Oregon Fire Marshall's office to draw up a state building code.

¶ Formation of another committee to investigate the possibility of establishing a single licensing law for both architects and engineers under the sponsorship of the Oregon Technical Council.

CEAO Mourns Loss of Kershaw

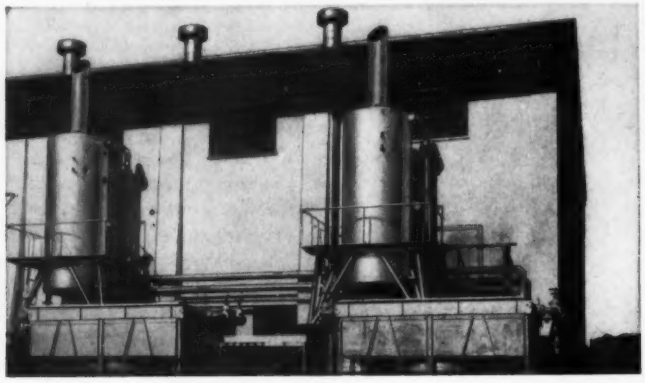
Oregon engineers have been saddened by the recent death of Chet Kershaw, founder of the Consulting Engineers Association of Oregon. He suffered a severe coronary attack in April. A graduate of the University of Minnesota, Kershaw was known for his work in the design of heat transfer equipment, but his fellow consultants remember him most for his almost single-handed efforts for the profession in the early years of CEAO.

CEAW Elects Officers

The Consulting Engineers Association of Washington has elected these officers for the coming year: chairman, Allen E. Hill, of Hill and Ingman; treasurer, Norman Carson, of R. W. Beck and Associates; and secretary, Milton Cook, of Tracey, Cook, Brunstrom and Dudley, all of Seattle. The directors include the officers and H. W. Kramer, of Carey and Kramer, Seattle; Harold H. Waller, of Hubbell and Waller Engineering Corp., Seattle; Horace J. Whitacre, of Horace J. Whitacre Associates, Tacoma; and Paul Isaac, of Hammond, Collier, and Isaac, Seattle. Allen Hill is the delegate to the Consulting Engineers Council.

Pacific Rim Conference

The California Council, AIA, is sponsoring the first Pacific Rim Conference, on October 7th-14th, at the Hawaiian Village Hotel, Honolulu. Architects and engineers from the United States as well as all Pacific nations have been invited to attend. The program, based on "Wellsprings of Design," will feature speakers of international renown. ▲▲



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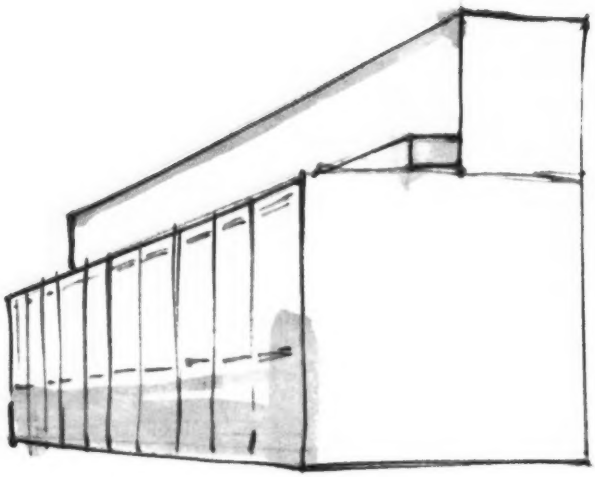
A dollar allocated for electrical equipment is worth more . . . when it is used to buy I-T-E equipment. Because I-T-E's policy is to build its equipment better, and yet charge no more.

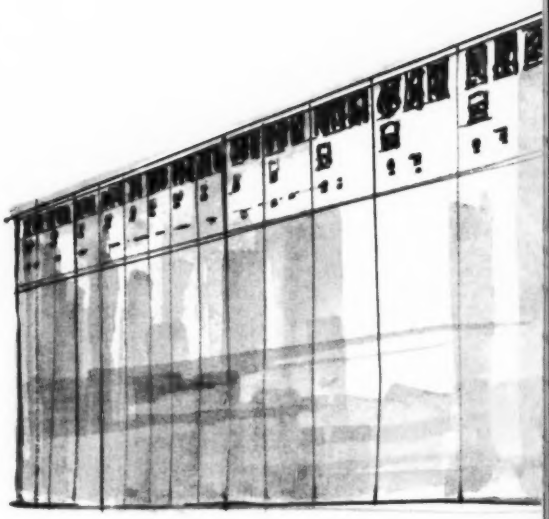
Take a typical secondary unit substation, for example. It features the new K-LINE circuit breakers . . . today's most advanced line. They stack four high in ratings up to 600 amp . . . save roughly ⅓ the space and half the weight formerly required. Circuit breaker pulldown handle with stored energy mechanism gives quick-make closure that means greater operator safety and longer contact life. The breaker can be drawn out to disconnect position without opening the door. And if the load increases later, expanded range trip devices adjust quickly and without added expense.

These features add up to real dollars and cents savings over the life of the equipment. Yet they cost nothing extra. In addition, I-T-E substations are engineered and manufactured in a single I-T-E plant for extra installation ease and better performance.

There are other I-T-E facts too. Turn page.

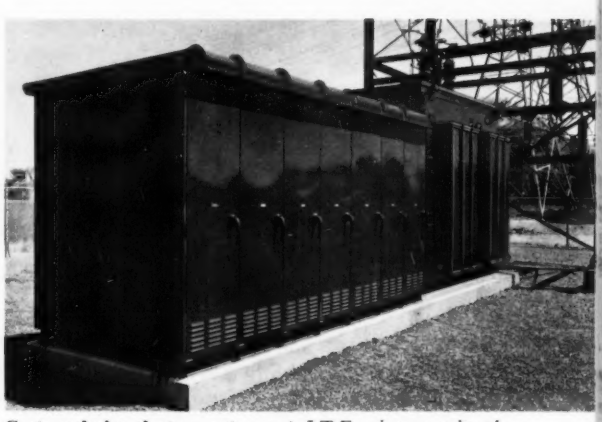
I-T-E CIRCUIT BREAKER COMPANY



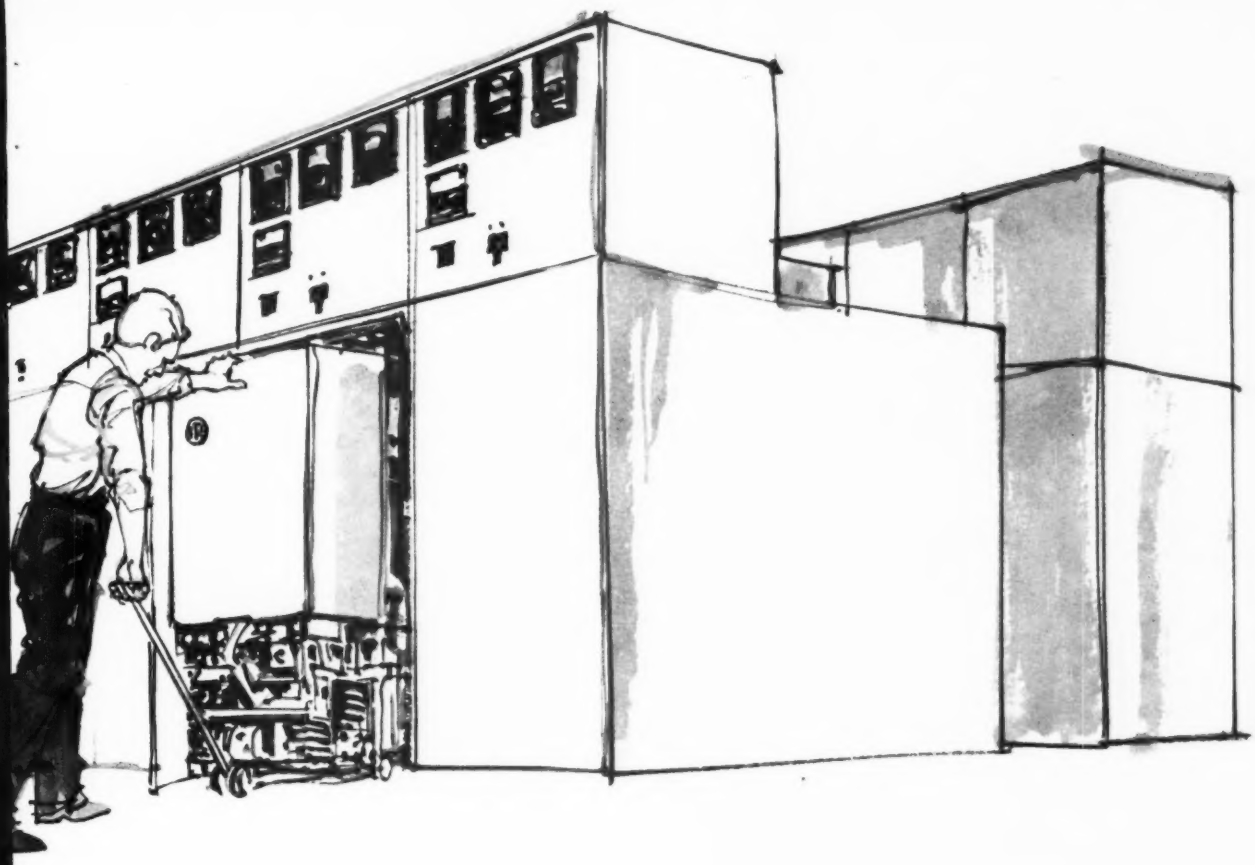


WHERE ELECTRICITY GOES I-T-E GOES

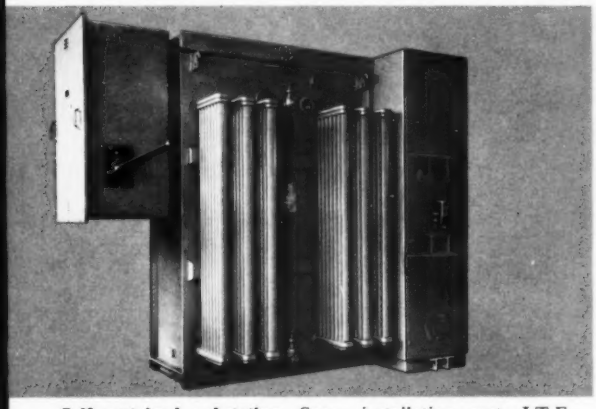
Are you fully acquainted with the broad I-T-E line . . . and the many ways it can help your dollars buy more?



Custom designed at no extra cost. I-T-E primary unit substations are designed and built to meet the specified power, space and future expansion requirements of the particular installation for which they're ordered. In addition to standard outdoor metal-clad construction, weatherproof walk-in switchgear is also available. Transformer and switchgear sections are constructed in the same plant to assure smooth coordination of components, easier assembly, pretested performance, and on-time delivery.



Protection for primary power. I-T-E metal-clad switchgear has many extra advantages not available elsewhere. Take a good close look. You'll find extra sturdiness that means extra serviceability. And extra craftsmanship that gives the owner a feeling of pride. For easy inspection, even the rear doors are hinged, and components are completely accessible. All essential circuit breaker components are mounted on the breaker for easier access. Uniform flux density magnetic arc field means superior protection . . . especially against high current faults. For extra safety, breakers stop automatically in test position when they're rolled into the compartments. They can't be moved into or out of connected position unless they're open.



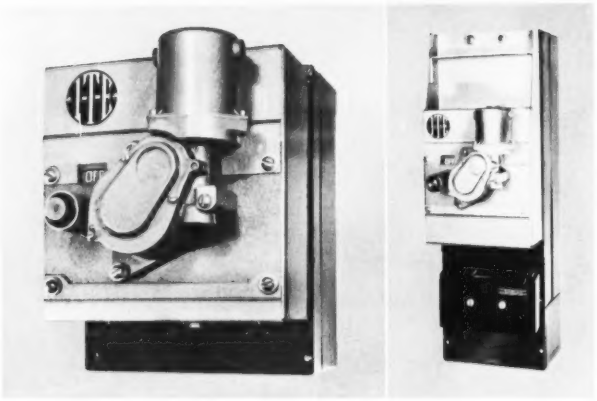
Self-contained substation. Saves installation cost. I-T-E TRANFO-UNIT combines primary disconnect, transformer and secondary circuit breakers all in one package. Nothing else to buy. Simplifies ordering. Delivered complete. Installation time and cost reduced to an absolute minimum. No complicated assembly of separate parts. Gives neat appearance. Completely safe. No live components open to contact by personnel. Needs no fence. Use for incoming power up to 3000 kva. Or spot near load areas in large plants.



600 volt value package. New URELITE® individually enclosed I-T-E K-LINE circuit breaker is ideal for single circuit protection and control, such as large motors and other heavy loads or for service entrance on many commercial-type buildings. Main disconnect contacts are visible through a side window for extra safety. Features quick-make closure, closed door disconnect, and expanded range trip device. Available in capacities from 15 to 1600 amp continuous, up to 75,000 amp interrupting.



Economical primary switching. I-T-E power switching centers save cost and time. Give dependable fused protection at low initial investment. Building block design speeds delivery. Preassembled units easy to install. Performance-proved I-T-E switches close safely into fault. Available for remote or automatic control. Up to 14.4 kv and 1200 amp.



Molded case economy . . . remote control luxury. Now I-T-E CORDON® circuit breakers are available with new TELEMAND* motor-operators for remote opening, closing or resetting. Gives pushbutton control from a distance. Permits automatic operation. CORDON circuit breakers provide up to 100,000 amp interrupting capacity in roughly half the switchboard space required by alternative devices. They cost approximately ⅓ less. TELEMAND is available for the complete range of molded case circuit breakers from 70 to 800 amp.

**Telemand is an I-T-E trademark*

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- ☐ Secondary unit substations
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- ☐ URELITE circuit breakers
- ☐ Molded case circuit breakers
- ☐ Metal-enclosed bus
- ☐ Outdoor air switches
- ☐ TRANFO-UNITS
- ☐ Power switching centers
- ☐ TELEMAND (motor-operated molded circuit breakers)
- ☐ K-LINE LV switchgear (600 volt)
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Troubles common to most air-cooled condensers are positively eliminated by these field-tested new "Buffalo" units.

"Buffalo" Air-Cooled Condensers are a sound engineering choice for your "problem" air conditioning installations. They are ideal for overcoming such conditions as weight and erection difficulties—high maintenance costs—winter freezing troubles—winter head pressure problems — water shortages — contaminated water — high water cost—high sewer tax—poor drainage.

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Easy-to-Install! Shipped as factory-assembled "packages." Lifting eyebolts simplify rigging.

Trouble-Free Operation! Service calls are practically nil, thanks to quality construction and unique control design.

Capacities: 7½ to 100 tons based on 120° condensing temperature, 40° suction, 100° ambient.

Vertical Discharge is unaffected by wind velocity. Holds compressor on line.

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Unit Casings! Heavy-gauge galvanized steel construction for durable long life.

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The New Jerguson Refragage gives you a sharp black and white reading of water level on high pressure boilers . . . with contrast similar to reflex gage.

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Heard Around Headquarters

NSPE DID NOT LIKE the Supreme Court's decision in the Cabot Carbon case. Cabot Carbon has committees of employees which exist for the purpose of dealing with employers on matters concerning grievances, labor disputes, wages, rates of pay, hours of employment, or conditions of work. These committees were not bargaining groups but they did "deal with" these matters. The Supreme Court decided that these committees were labor organizations and must operate as such under the law.

This is worrisome to the National Society of Professional Engineers, for it would seem to indicate that some or all of the "sounding board" groups also might be so judged by the court. Several sounding board organizations of employee engineers are affiliated with NSPE, and if they are judged to be labor organizations, this could be most embarrassing to the National Society. NSPE always has taken the position that they are a professional organization, and while interested in employee-employer relations, they want nothing to do with actual bargaining. NSPE is now in the peculiar position of being hotly condemned by labor organizations as a society representing only management while these recent court decisions seem to bring some parts of the NSPE organization closer and closer to being defined as bargaining groups.

Common Law of Ethics?

The Board of Ethical Review of the National Society of Professional Engineers plans to collect and publish its decisions on cases involving professional ethics. It is hoped that over the years this material will form a body of opinion similar to that provided by the American Bar Association in its publication of opinions on ethical cases that it has reviewed.

The Board of Ethical Review will use the Canons of Ethics as its code, and its decisions will be based upon its interpretation of them. The Board will not confine itself to a simple decision on a case but will publish full majority and minority opinions covering all aspects as thoroughly as possible.

The gradual collection of these opinions will provide a sort of common law of professional ethics that will supplement the often vague and frequently platitudinous statements of the Canons. The first opinion of the Board of Ethical Review (see "Tranquil Tower," August 1959) was published following the last national meeting of the Society in New York. Several other cases are now before the Board, and the

BRUNER Industrial WATER SOFTENERS

. . . are frequently

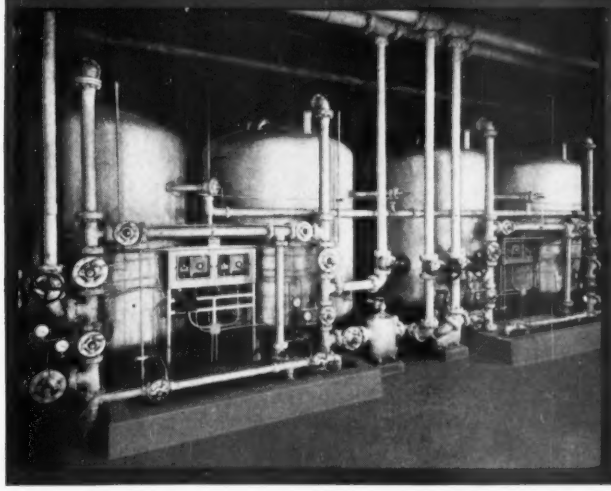
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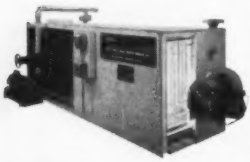
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These forced recirculation water tube Generators extract *more* heat from *less* water. By merely increasing the temperature differential between boiler outlet and return water from the "conventional" 20°F. to 80°F., water flow rates are cut 75%. Lower flow rates mean reduced pipe and pump sizes, with attendant savings throughout the system. With International-LaMont THERMOJET® Generators, temperature differentials up to 200°F. are in use and are recommended, effecting even greater savings.

Positive, high velocity boiler water circulation assures peak heat absorption rates—far beyond those obtainable with natural circulation boilers, plus instant response to changing load demands. Any danger of thermal shock is eliminated.

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opinions will be ready at the time of the next meeting, which will be in Pittsburgh in October.

Echoes from Salt Lake

The Producers' Council reports that their Salt Lake City chapter has been working actively to solve some of the problems of professional practice in that area (see "Field Notes," May 1959). The local Producers' Council chapter was responsible for bringing together architects, consulting engineers, state officials, contractors, and producers at a building construction seminar. The objective was to establish an official, mutually agreeable liaison between the participants. Glen Swenson, of the State Building Board, set the tone for the meeting when he cited the mutual responsibility of all segments of the industry to upgrade practices pertaining to the process of construction. The AIA representative, William Rowe Smith, stated that "we must coordinate activities of all who will influence the construction of a building." He encouraged use of consulting engineers.

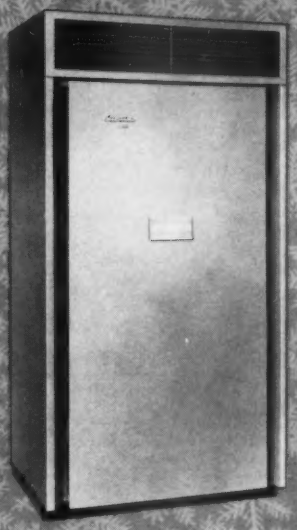
As a result of the seminar, the State Building Board already has adopted policies on the use of independent engineers, types of specifications, and the architect's fee. It looks like good results are coming from cooperation of all members of the building industry in this area.

CEC Council Activities

At the recent executive committee meeting of the Consulting Engineers Council, Lyle W. Jones was employed to act as Washington representative for the Council. Jones has had extensive background and experience in Washington representing various trade groups. For the first year, Jones will work for the Council on a part-time basis. His duties during this preliminary period will consist primarily of keeping an eye on the Washington scene and keeping the officers of the Council informed. The mem-

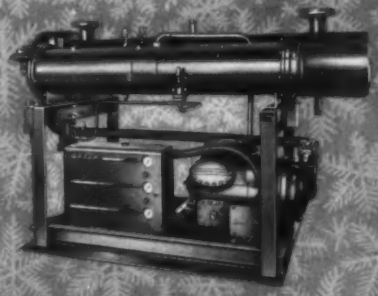
Curtis

CONDITIONS COMMERCIAL AMERICA...



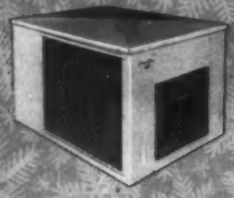
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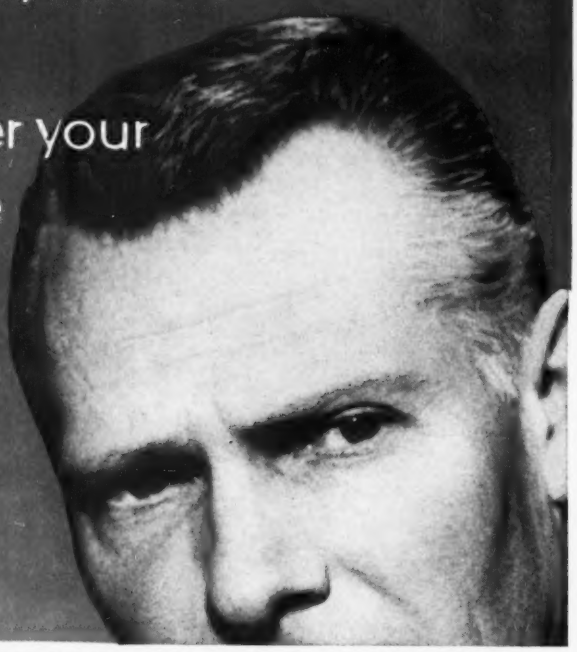
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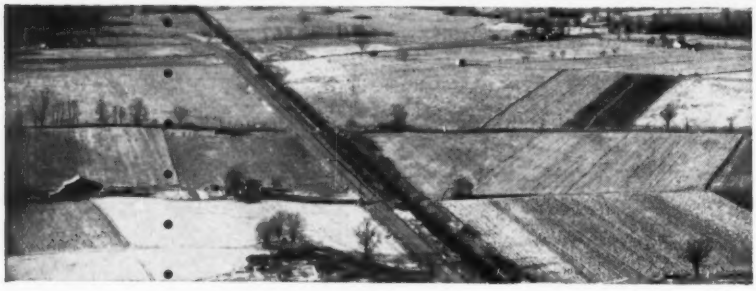
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bers of the executive committee and their representatives will continue to make policy contacts in Washington.

The executive committee also made a study of special and standing committees of the Council and decided that the current system of appointing committee members by geographical distribution is impractical. It was decided that it would be more appropriate to assign committee tasks according to member associations. In this way, committee members would be located near to each other and could work better. Local meetings of committees could be held regularly and much more could be accomplished than when members of the committee were spread all over the country. Chairman of parallel committees set up in other associations could act as advisors or reviewers of the prime CEC committee's work.

John F. Hennessy, Sr., of Syska & Hennessy, has been appointed as a representative of CEC to the Engineers Joint Council and the Engineers Joint Council-American Institute of Architects joint committee. The Council, while a member of EJC, had been sitting on this joint committee on the invitation of the architects. Now, CEC will have its own representative to the joint committee in Mr. Hennessy.

CEC has been faced for about a year with the problem of a proper dues assessment for members at large. Members at large are consulting engineers or consulting engineer firms located in an area in which there is no association affiliated with the Council. At the last executive committee meeting in Springfield, it was decided that these members at large would be charged the regular CEC dues assessment plus $50 — an amount estimated as comparable to most association dues. No member at large firm will be assessed for more than three principals regardless of the size of the firm. This puts the financial obligation of members at large on a comparable basis with

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insulated curtain wall of its type

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Here's a fellow that's literally making construction history. In one simple operation he's erecting a complete exterior wall, finished inside and out—fully insulated—and ready for use as installed.

This revolutionary advance in curtain wall construction is made possible with new Butler Monopanl. It is the first factory-fabricated, factory-insulated panel that is factory sized to fit a pre-engineered structural system . . . and it is exclusive on Butler buildings.

Today, even the largest Butler buildings can be enclosed in just days with handsome, slender—space-saving—curtain walls that permanently seal out weather and are equal in insulating ability to thick masonry.

Now, with new Monopanl, the Butler system of building is an even faster, better way to build . . . more than ever, the lowest-cost way to build well.

Call your nearby Butler Builder for full details. Ask him about Butler financing, too. He's listed in the Yellow Pages under "Buildings" or "Steel Buildings." Or write:



A Monopanl is literally a metal "plank" complete with decorative outer face, insulation and finished inner face. Complex configuration makes it the strongest panel of its type.



The unique double tongue-and-groove design creates strong panel-to-panel joints, permits push-together assembly. Vinyl gaskets seal out moisture permanently.



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An installation of the magnitude and complexity of the Air Force Academy requires the most complete, flexible, efficient sound communication system. We are proud that a Stromberg-Carlson system was selected.

This is one of the largest sound installations in the U.S., with almost 3,000 speakers.

The system is unique in that simply by indexing one switch it can be used as an emergency system. Other important functions of the Stromberg-Carlson system:

- **Audible time signals operated from a master clock system**
- **"Satellite systems" in various areas which can operate independently**
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The Stromberg-Carlson system at the Academy was "custom-engineered" from standard components. The economy and flexibility of this arrangement are available to meet your needs in all types of construction.

Our field engineers are available for consultation. And our factory-trained distributing organization is ready to handle installation and maintenance problems.

You'll find the name of your nearest Stromberg-Carlson distributor in the Yellow Pages under "Public Address & Sound Equipment."

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consulting engineers that are represented in the Council through their local association.

The entire membership of the Iowa Association of Consulting Engineers has been designated by the CEC executive committee to act in the capacity of a special task committee to compile all known existing fee schedules. Tabbed for the project by the Council's officers at their recent Springfield meeting, the Iowa Association will compile and collate everything published to date in the way of an engineering fee schedule. Included will be local, state, national, and even international fee scales. A report on the compilation has been requested in time for the November 1959 board of directors meeting.

MACE Formed in Boston

Thirty Boston consulting engineers interested in the formation of an association of consulting engineers in the Massachusetts area, met on July 21 in the Boston Engineers Club. They formed an association and elected Hugh P. Duffill, of Duffill Associates, Boston, as president. Paul W. Norton, of Nichols, Norton & Zaldastani, was elected vice president, while John Maguire, of Stresenger, Adams, Maguire and Reidy, was made secretary. Christos D. Bratiotis, of Hayden, Harding & Buchanan is treasurer of the newly formed association.

Committees were appointed to study the subject of objectives, membership, and government of the organization. These committees are to report back to a meeting of the officers on September 15. The next general meeting of the association will be held on September 29 for final action on the reports of these committees.

This new association has representatives from all of the engineering societies in Boston. This means that the Massachusetts Association of Consulting Engineers will have members from civil, structural, mechanical, and electrical firms. Membership will include firms in private



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Ask the operator on any job why he likes his Clyde and he'll tell you feature by feature.

Maybe the internally expanding band friction clutch, its extremely easy and smooth engagement and release and the elimination of shock loads is a feature he appreciates most. Or the fact that he need only 'toe' the extra heavy duty, large diameter brake for safe, sure and accurate load control.

No doubt he will tell you about some of the many other features he likes . . . anti-friction bearings throughout that result in greater line pull with less power . . . low cost maintenance as well as low operating costs . . . correct diameter, semi-steel drums that afford smooth and rapid free spooling.

Clyde operators and owners too, are Clyde's best hoist salesmen . . . the finest compliment that can be paid to the modern engineering and precision manufacture of the Clyde line of finest quality material handling equipment.

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This 15-story parking garage in St. Louis is but one of the many jobs on which this Clyde Hoist has helped to maintain or even better construction schedules.

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practice that serve primarily architects and those that deal almost exclusively and directly with the owner-client. It is expected that the group will apply for membership in Consulting Engineers Council.

Hugh P. Duffill, the president of MACE, is also a member at large of Consulting Engineers Council. He is well known not only in Boston and New England, but also in international consulting engineer activities. He attended the recent meeting of the International Federation of Consulting Engineers (FIDIC) held in The Hague this past May.

French Consultants Elect

The Chambre des Ingenieurs-Conseils de France has elected officers for the 1959-1960 Society year. The president, G. Beau de Lomenie was re-elected. Secretary general is H. Pamelard of Paris. The three vice presidents are A. Cabel of Lyon, J. Lannes of Paris, and J. Paquier of Paris. The new treasurer is M. Levant of Montfermeil. G. Bory continues as the Chambre representative to the International Federation of Consulting Engineers, of which he is vice president.

BAEC Elects President

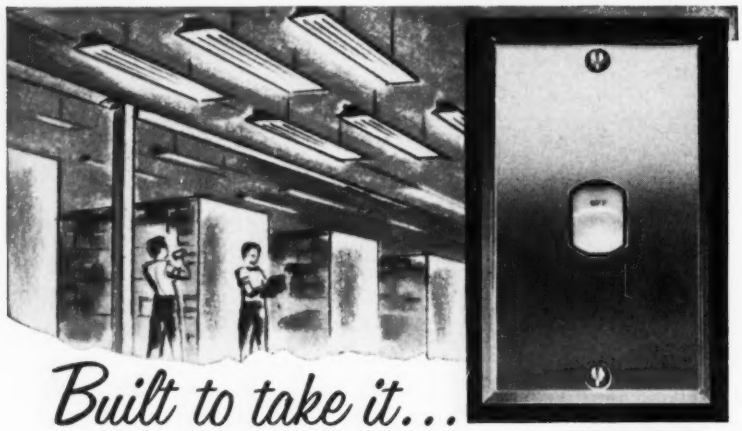
J. M. Linton Bogle, of Lemon & Blizard, London, has been elected president of the British Association of Consulting Engineers for the coming year. Mr. Bogle is a member of the Institution of Civil Engineers, the Institution of Mechanical Engineers, and the Institution of Water Engineers.

Mr. Bogle was taken into the Lemon & Blizard partnership in 1933 and has been consulted by government departments, nationalized industries, water boards, and various other local authorities on many schemes involving sewage disposal, sea outfalls, and surface water drainage.

GE Catalog Complimented

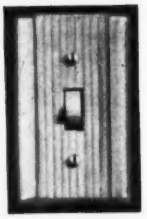
The *Newsletter* of the Consulting Engineers Council states that a number of their officers and directors have mentioned the excellence of General Electric's new *Electrical Equipment Specifications Manual.* Perhaps one of the reasons the *Manual* is welcome is that it was written and published according to the recommendations of CONSULTING ENGINEER's "Committee of One-Hundred" (see How to Prepare Catalogs for Consulting Engineers, January 1958). General Electric gives the "Committee" full credit for letting them know what consultants want in the way of technical information from manufacturers.

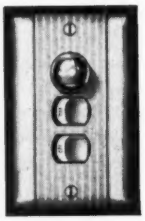
It is interesting to note that CEC and Producers' Council are now working on a project to make annual awards to the manufacturers who do the best job of preparing catalogs and other advertising material designed for consulting engineers. AIA and Producers' Council have conducted a similar program for a number of years. ▲▲



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Available in Despard interchangeable type, Despard Type mounted on strap and narrow rocker for tumbler switch plates. A specification grade switch, 15 and 20 amps. 120/277 volts AC.

For more information write Dept. CE-959

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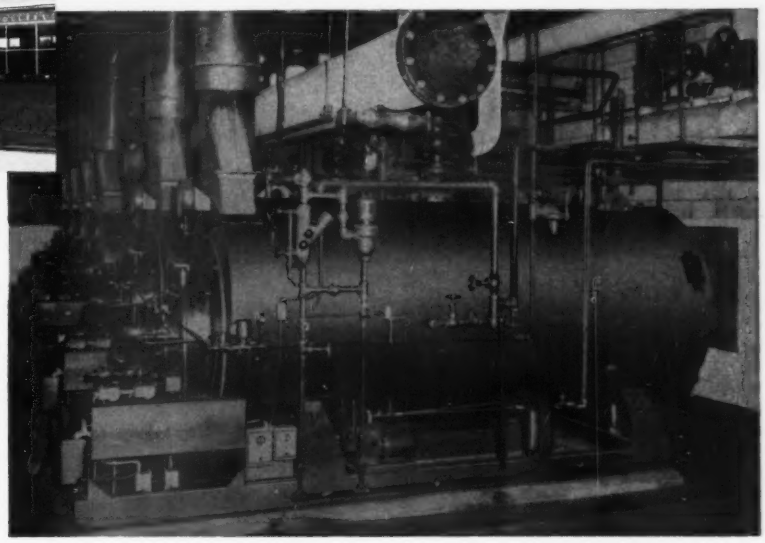
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One of the largest producers of graders, roadscrapers and rolling equipment, Galion Iron Works & Manufacturing Co., has six 125 HP Cyclotherms now operating, plans to add a seventh and eighth as steam demands increase. Automatic operation has been the big factor in helping Cyclotherm make the grade with the graders!

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With Cyclotherm Steam and Hot Water Generators, you buy steam capacity as you use it. No investment in excess capacity. No steam shortage with an outgrown boiler.

Cyclotherms give flexible capacity. You can add 518 lbs. of steam per hr. with a 15 HP Cyclotherm, or 25,875 lbs. per hr. with a 750 HP Cyclotherm. And there are 16 intermediate sizes to choose from.

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Cyclotherms operate with automatic efficiency. On 15 to 60 HP units, burner automatically shuts down when steam demands are satisfied, automatically turns on when more steam is needed. On 80 to 750 HP units, modulation controls regulate firing rate from 30% to 100% of rated capacity, without loss of efficiency. Operation stops automatically if firing sequence is interrupted and unit "fails safe."

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Cyclotherm burner and boiler are built together to work together — one manufacturing responsibility back of the entire equipment. Units are fire-tested at factory, shipped ready to operate. Cyclotherms are up to 1/3 smaller than other package boilers of same capacity. Installation is easy—no costly stack, no excavation, no foundation.

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"Cyclonic Combustion"—Cyclotherm's patented combustion principle—guarantees a minimum of 80% efficiency, meets all state requirements, conforms to A.S.M.E. and National Board standards, carries Underwriters' Laboratories label. Steam Generators from 15 HP to 750 HP, burn oil and/or gas. Hot Water generators in 10 capacities, from 670, 000 BTU per hr. to 6,700,000 BTU per hr.

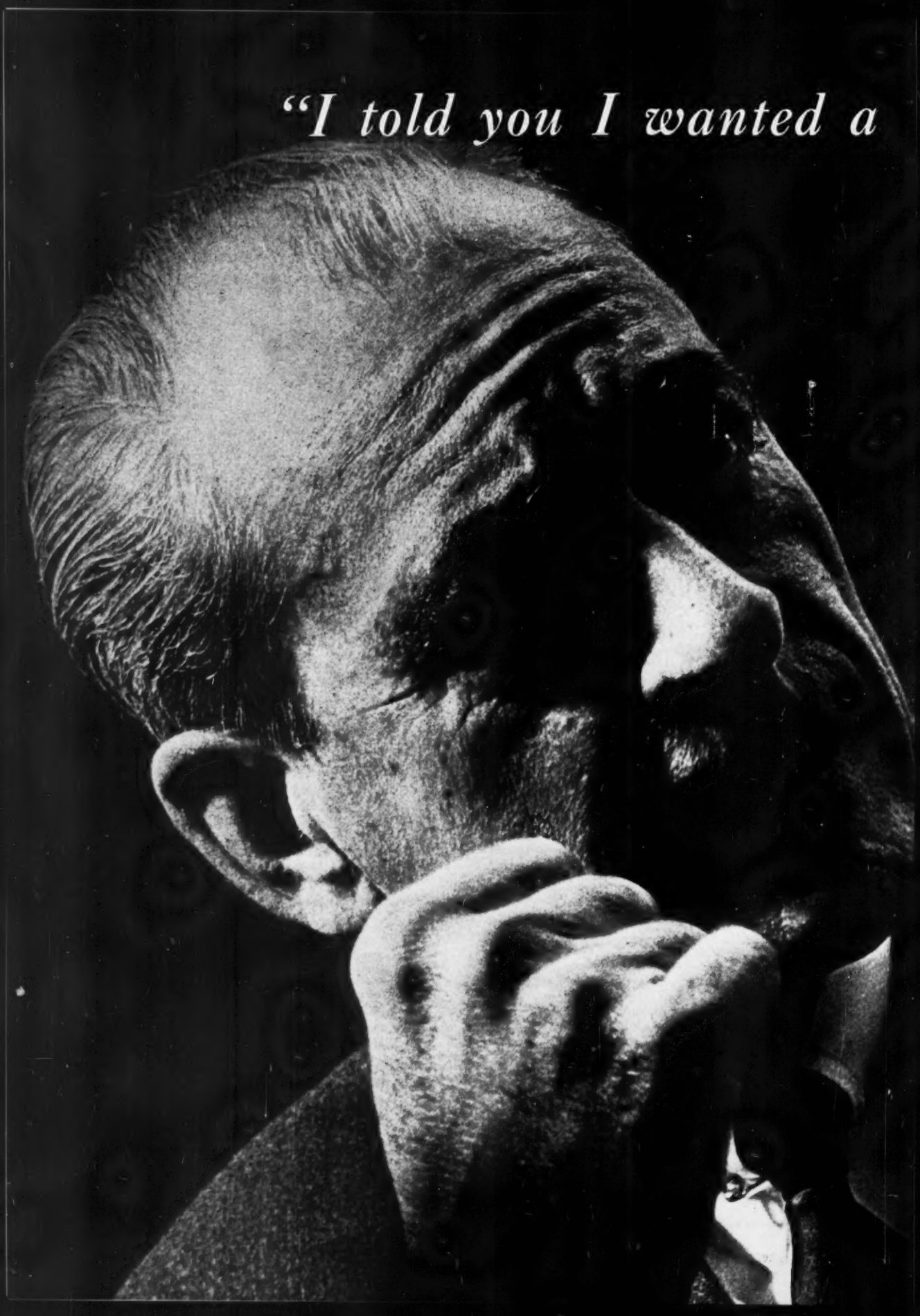
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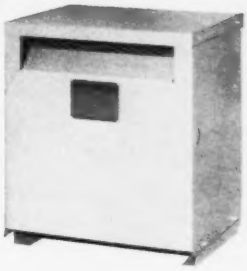
Please send me your booklet *Cyclotherm Cyclonic Combustion*, also rotogravure copy of *Cyclotherm Sales Steam* with illustrations and descriptions of Cyclotherm installations.


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QUIET *transformer!"*

...and QUIETNESS is one of the big advantages of General Electric dry-type transformers



There's no reason to have noise complaints on transformers! Just make sure you specify the transformers which are designed with the complete sound spectrum in mind—General Electric's complete line of QHT* dry-type transformers.

HERE'S WHY: General Electric has considered not only the *volume* of transformer noise but also the *tone* qualities. General Electric QHT dry-type transformers have up to 15 decibels lower sound ratings (volume) than NEMA standards. Sound spectrum tests (tone) in General Electric's Sound Laboratory, located in Fort Wayne, Ind., have permitted G-E engineers to study the QHT design and vary its components to give you a *balanced design*—the best balance between electrical performance and sound qualities.

Why not specify General Electric dry-type transformers? They represent the ideal balance of quiet operation, small size, light weight, high-temperature silicone insulation and long reliable transformer service.

Your customers look for you to know the difference in transformers. Make sure you do! Ask for the complete story on G-E dry-type transformers. Your local General Electric Distributor or Apparatus Sales Office can show you the advantages of G-E QHT transformers. Or send in the coupon below for GEZ-2506A, "Sound Testing of QHT dry-type Transformers."

*Quiet High-Temperature Dry-Type Transformers.

GENERAL ELECTRIC

Send for this bulletin for the full story on G-E sound-level testing of transformers.



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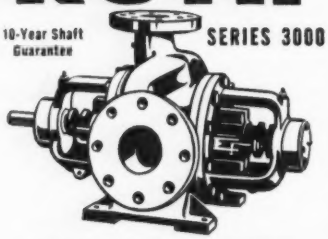
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The Word From Washington

EDGAR A. POE
Consulting Engineer Correspondent

CHAIRMAN CLARENCE CANNON of the House Appropriations Committee was the legislator who proposed that the committee inquire into the employment of consulting engineers by various government departments for surveys and design work.

A colleague of Representative Cannon said the Missourian is disturbed because of what he described as "exorbitant fees" being charged by some private consultants for their survey and design work. Neither particular projects nor names of consultant firms have been identified.

The colleague said Chairman Cannon's proposed inquiry into practice of employing private engineering firms was designed more as a warning to firms charging assertedly excessive fees than anything else. He said, "He just wants those high fees stopped or else."

No "Tax Paid Vacations"

The Internal Revenue Service has reiterated its warning that "tax paid vacations," in summer or winter, will be disallowed. IRS agents said they will closely check purported business trips which in effect represent vacations at resort hotels, hunting trips, or attendance at sports events.

TVA Growth Continues

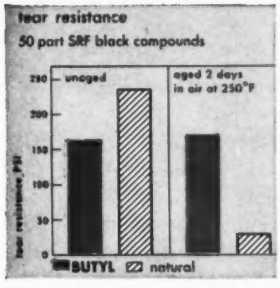
The Tennessee Valley Authority, after being given the green light by Congress, is planning to spend $383 million in new electric power generating capacity through the fiscal year ending in mid-1961.

TVA officials also propose to expand capacity by several million additional kilowatts by selling the bonds Congress authorized. Under the new law TVA cannot have more than $750 million of bonds outstanding at one time.

TVA, embracing the 41,000-square mile Tennessee River watershed in Tennessee, North Carolina, Virginia, Alabama, Georgia, Mississippi, and Kentucky, has grown financially strong and economically powerful after 25 years of nourishment on $2 billion in taxpayers funds. Under the new

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law, however, the revenue bonds, will have to compete with the going interest rate, and TVA will have to charge electric rates high enough to pay the interest and retire the bonds.

The 650-mile long Tennesse River runs into the Ohio. The fall of the river is about 500 feet, 135 of which is concentrated in the Muscle Shoals area in the Northwest corner of Alabama. With Uncle Sam's subsidy, a substantial portion of this valley has been transformed into a land of milk and honey where not many years ago it was marked with poor hillsides and mountain farms and an occasional moonshine still.

In 1933 there were fewer than 300,000 electricity consumers in the basin of the cool, blue waters of the Tennessee. Today there are 1.5 million, and testimony before Congressional committees showed that the demand for power is increasing rapidly as the ever-rising standard of living calls for more electricity.

Another TVA?

A pending legislative proposal that would create a new Federal power marketing empire in the Northwest will remain alive in the second session of the 86th Congress convening in January.

Patterned after the controversial Tennessee Valley Authority, the measure would create the Bonneville Power Corporation. Opponents, including private electric power spokesmen and some officials of western states, maintain that it would result in eventual monopolization and nationalization of electric power in the vast Northwest region.

Backed by the National Rural Electric Cooperative Association and labor unions, the public power plans would have far-reaching ramifications. Under terms of the bill the power marketing giant would be authorized to borrow up to $1.1 million from the United States Treasury to put the mighty plan in operation.

In addition to using rivers of the Pacific Northwest to generate power, it also would authorize construction of coal burning, oil burning, and gas burning steam power electric generating plants.

Because the broad public power blueprint would (like TVA) be exempted from normal taxes, a number of state and local officials are opposed to the proposal. The power rates would not include provisions for taxes, which would give it strong competitive advantages.

New Construction Estimate Up

New construction in 1959 will exceed $53 billion – a total of from 9 to 10 percent greater than 1958 – according to estimates by the Departments of Commerce and Labor. Assuming it reaches or exceeds $53 billion, this would amount to a billion more than economists forecast at the begin-

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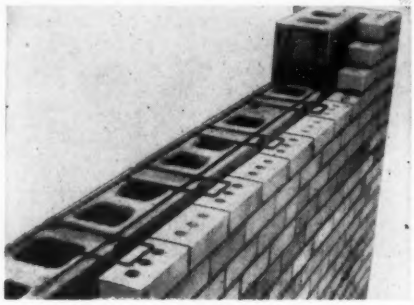
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Another BYRNAPERTURE Installation

Architects and Engineers—Broad & Nelson & Jack Corgan; General Contractor—J. E. Morgan & Sons

Again, American Airlines utilizes the Byrnaperture—this time in their new $1,350,000 hangar and maintenance facility at Dallas Love Field.

The Byrnaperture—an exclusive hangar door design feature by Byrne—consists of a series of movable segments, operated either by hand or electric power, which fit snugly around the aircraft fuselage. Providing a completely weathertight closure for the portion of the plane on which maintenance work is performed, it makes possible a reduction of up to 33% in hangar construction costs. While the use of the Byrnaperture is pictured with a DC-7, it is equally adaptable for larger aircraft such as the Boeing 707. In this installation two door openings are provided, each 155 feet wide by 32 feet high.

If you are looking for the most advanced ideas in door engineering—whether for airplane hangars or industrial purposes—Byrne should be your logical first source. Let us send you full information—or, better yet, sit down with you to discuss the door requirements for any project you may have in process or under consideration.

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ning of the year. Government economists now predict that private residential construction will run from $1 billion to $1.5 billion more than was estimated at the end of 1958.

Influence Peddling Brass?

There are many retired Army, Navy, Marine Corps and Air Force officers making from $8000 to $100,000 a year as consultants, representatives, or officials of munitions contractors. They receive their retirement checks from the Federal government each month. At the same time they receive their salary and dividend checks from the manufacturers of goods who provide services for the Department of Defense, the world's biggest spending agency.

Hearings conducted by the Hebert Armed Services Subcommittee failed to disclose any widespread influence peddling, which would be difficult to prove and define. Nevertheless, the Committee is proposing in legislation some ground rules in the field of propriety, ethics, and morals for the guidance and control of these officers who have a role in the spending of billions of dollars at home and abroad.

Keogh Bill Bogs Down

The House-passed Keogh bill, opposed by government tax men, got bogged down in the Senate. The measure would give engineers and other self-employed persons a tax break in setting up their own retirement plans.

Although initially it would cost the Treasury $365 million a year, officials of the Department insist that if the deductions under the proposal were greatly expanded it could cost $3 billion a year.

REA Subsidy Loans

Congress turned thumbs down at the 1959 session on President Eisenhower's proposal to raise the subsidy 2 percent interest rate on loans to REA power cooperatives. Nevertheless, the Administration is expected to renew its efforts at the 1960 session, even though it is a big election year.

Eisenhower administration officials, as well as many conservative Democrats and Republicans, feel that with more than 95 percent of the farms now electrified, REA could enter the commercial money markets for at least part of its new lending funds. The Federal government now has to pay greater than 4 percent, plus other carrying charges, to make 2 percent loans.

Hemisphere Economic Bloc

Senator George A. Smathers declares that it is extremely important to the future welfare of the United States that a Western Hemisphere Economic Community be created. The Florida Senator, chairman of the Latin American Subcommittee of the Interstate and Foreign Commerce Commit-



COLT S.R. Series Ventilator (natural gravity —for any type roof)

Bank of 12 Colt "SRC/3080" Ventilators installed for Minneapolis-Honeywell Regulator Co., Appliance Controls Division, Gardena, California. Empire Steel Buildings Co., Engineers and Builders, Los Angeles.

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Manufacturers across the nation are discovering the advantages of moving air and exhausting excess heat from their plants the economical and efficient **COLT** way. The revolutionary new **COLT SR Series** of natural draft ventilators produces maximum positive extraction of excess heat and stale air. This new extra high performance ventilator was developed by COLT to meet the problem of extremes in climate. COLT will save you real money. **Send coupon today for complete detailed information.**

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Right off the Wire

42. A 150-watt lamp only three and one-half inches high is said to give a screen brilliance in a movie projector equal to that of a 750-watt lamp.

43. A new electron tube that will go inside a thimble is being made to compete with the transistor.

44. Rustproof hub caps for automobiles are being made of fiberglass.

45. Bulbs can be installed in a new electric light fixture with only a quarter of a turn.

46. An inexpensive attachment for any radio sounds an audible warning if radioactive fall-out reaches a dangerous level.

47. A giant earth mover, driven by an electric motor in each of its eight wheels can scoop up a fifty-ton load in less than two minutes.

48. Ultrasonic energy, used in machining hard or brittle metals, can now be transmitted around corners.

49. A research camera with 1,200 lenses can take pictures at the rate of 42,000 per second.

50. A new diesel-electric locomotive can be switched to third-rail operation without stopping.

51. Electric automobiles are in production again. Range on a charge is eighty miles.

52. A miniature TV system made for use in a missile weighs only nine pounds and has a range of 1,000 miles.

53. Maximum spark at all engine speeds is claimed for a new transistorized ignition system for internal combustion engines.

54. The first telescope in space is in the plan stage. It would map the sky in ultraviolet light which is blocked by the earth's atmosphere and would be supported by an unmanned orbiting vehicle.

55. A proposed atom smasher would be two miles long and eight times more powerful than any now in existence.

56. Paraplegics may use a new typewriter in which photoelectric cells are substituted for keys. A lamp on the user's head actuates the cells.

Further information on these news items and on Simplex cable is available from any Simplex office. Please be specific in your requests.

57. Aluminum shingles are now being made in a variety of permanent baked enamel colors.

58. A new helicopter can carry six tons of cargo.

59. A system of harnessing helicopters in teams by the use of metal spreaders has been developed.

60. An electric drink mixer that can be used anywhere operates on flashlight batteries.

61. A dentist has invented a toothbrush powered by an electric motor.

62. The successor to the "Jeep" is a new 1,700-pound vehicle powered by an aluminum, air-cooled V-4 engine.

63. A New York Bank has installed a clock, powered by a radioisotope, that will run for 200 years without winding.

64. Interchangeable tips for pliers make one tool serve many purposes.

65. The Air Force has discovered that submerging a man in water doubles his resistance to acceleration.

66. A new Army rifle is replacing the Garand. It holds twenty cartridges which can be fired at the rate of twelve and one-half a second.

67. Plate glass floated on the surface of molten metal is said to have a better finish than that produced by grinding and polishing.



A NEW MINE—
UNDER 50′ OF WATER!

Seven miles off the coast of Louisiana, Freeport Sulphur Co. is completing the world's first offshore sulphur mining plant. This unique engineering project consists of a Y-shaped steel island nearly one mile long (the world's largest) erected over a major new sulphur deposit known as Grand Isle.

Supplying power to the drilling platforms and other machinery are Simplex ANHYDREX XX insulated Submarine Power Cables. With a background of forty years' service to the mining industry, Simplex is proud to have contributed to this pioneering project.

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tee, says that the United States and our 20 Latin American neighbors are dependent upon each other from a defense standpoint as well as trade. It also is estimated that about one-third of the United State's private investments abroad are in the economies of Latin American countries.

The population of the 20 Latin American countries, currently estimated at 175 million, is expected to total 300 million by the year 2000. Meanwhile, about 26 percent of our exports go to Latin America, and 28 percent of our imports come from those countries.

Latin America Technical Missions

Eight additional missions to supply direct technical assistance to six Latin American countries have been approved by the Organization of American States, bringing the total to forty. Assignments will send specialists, provided by the Pan American Union and the General Secretariat of the OAS, to undertake city planning, rural housing, technical educational projects, and social service at the request of Argentina, Brazil, Colombia, Cuba, Eucador, and Peru.

Interstate Road System

A bill that would authorize governors of the various states to approve interstate road system links in their respective states appears likely to wither away on the legislative vine.

Senators Joseph C. O'Mahoney and Gale McGee of Wyoming, both Democrats, sponsored the measure and sought its passage before the Senate Public Works Committee. The measure was introduced after a bitter Wyoming dispute concerning location of an interstate road. Governor J. J. Hickey of Wyoming testified in behalf of the measure.

Urban Renewal vs. Road Building

With urban renewal picking up momentum across the country, engineers and planners of the Urban Renewal Administration and the Bureau of Public Roads are working together in connection with their policies and procedures.

Slums and blights have corroded deeper into many communities than many municipal officials have been willing to acknowledge in the past. Federal officials say that hundreds and hundreds of communities already have initiated plans to stamp out slums and blighted neighborhoods.

Officials of the Urban Renewal Administration declare that one of the most important phases of urban renewal is its relationship to highway planning and construction. Therefore, it is imperative that all urban renewal and urban highway activities be closely coordinated to prevent any conflict between them.

The Bureau of Public Roads estimates that cars, trucks, and busses will be driven close to 70-billion

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Serving: Aeration tanks.



For complete information on Spencer Blowers, available in capacities from 1/3 to 1,000 H.P. . . . up to 20,000 C.F.M. . . . 4 oz. to 10 lbs. pressure . . . request Catalogs 126B and 142B.

And for sound reasons! Consulting engineers specializing in this field recognize that the overall superiority of SPENCER blowers stems from solid, specific advantages, including:

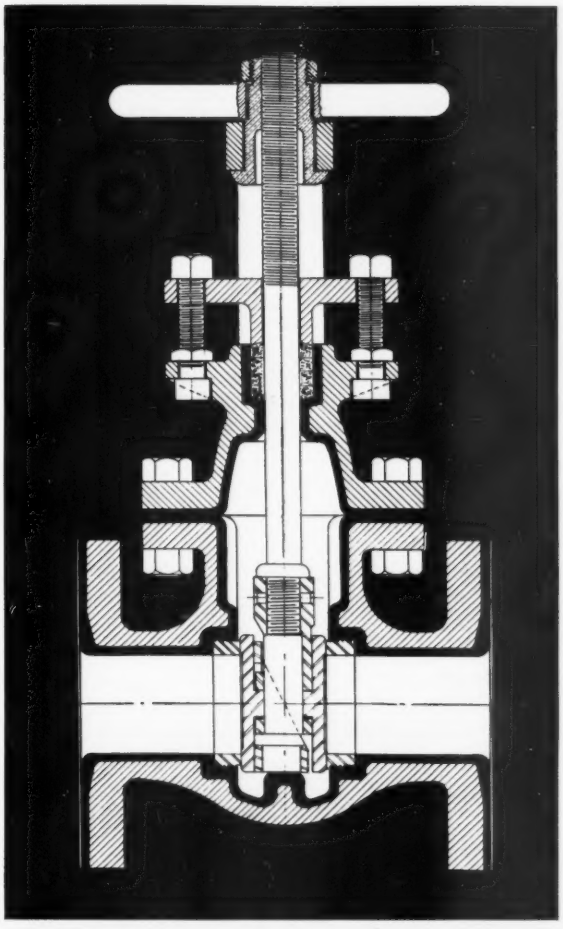
POWER SAVINGS—Blast gate feature—*exclusive with Spencer*—permits *controlled* air delivery. Power is used only in proportion to air volume required.

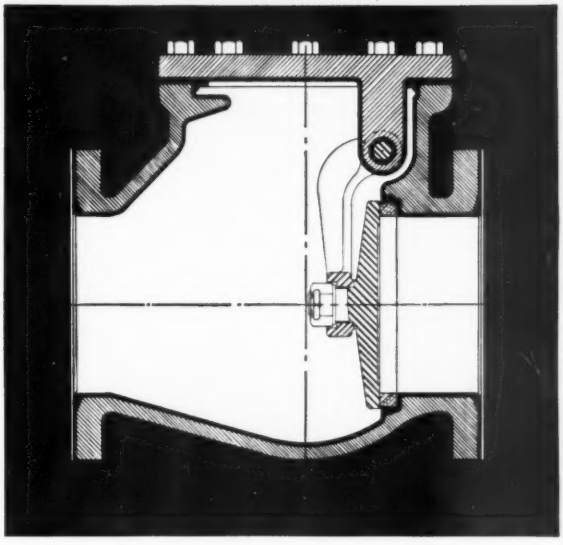
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2. Special hard rubber lining on bodies and bonnets (see diagram) provides high resistance to corrosion and abrasion.
3. Revolving double disc parallel seat and "no pocket" discs provide positive sealing and assure ease of operation.

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DARLING VALVES

miles in the U. S. this year. More than 40 percent of this year's mileage will be in urban areas.

Small Tax Cut for 1960?

Hearings will be inaugurated Nov. 2 by the House Ways and Means Committee which could pave the way for a small tax cut in 1960.

Chairman Wilbur D. Mills says the first phase of the study will consider closing loopholes in existing taxes. Panels of tax experts will study trade and business deductions, including those permitted for entertainment, retirement and other benefit plans, depreciation, research and development costs, and stock option plans.

There is some support within the committee, where all tax legislation must originate, for a proposal by Representative Abraham J. Moulter, Democrat of New York. It would give firms with taxable incomes under $150,000 a year up to $33,000 in extra tax deductions for funds reinvested in modernization, expansion, or new building or equipment; reduce the basic corporate tax rate from the present 30 percent to 20 percent; raise the exemption to the 22 percent corporate surtax from the present $25,000 to $150,000; and provide fast tax writeoffs for purchase of used equipment and machinery up to $50,000 a year.

Interstate Business Tax

A substantial amount of confusion has cropped up across the land as the outgrowth of the United States Supreme Court decision upholding the rights of states to tax firms on income that has been earned in interstate business.

As a result a House Judiciary Subcommittee, headed by Representative Edwin E. Willis of Louisiana, will start hearings this autumn on the many bills that have been dropped in the legislative hopper. Most of the pending measures would limit the rights of states to tax firms which have no offices, inventories, warehouses, or stores in those states, thus in effect overriding the Supreme Court ruling.

"This whole over-all legal question is highly complicated," said Chairman Willis. "It would be our desire, if possible, to come up with legislation providing for taxing by the various states as uniform as possible, and thus prevent double taxation of income."

Bills are pending which would prohibit a state from taxing a firm unless it has maintained a stock of goods, an office, warehouse, or other place of business, or had an officer, agent, or representative who had an office in a state.

Labor Force Growth

American labor force totals are going to increase sharply. A substantial part of the swelling numbers grows out of the fact that more women and youngsters are working part time. Labor Department experts predict that the 70 million workers now employed full or part time will climb to 80 million in 1965; 95 million by 1975.

Per Diem Rates for Consultants

Per diem rates for experts and consultants providing a service to defense agencies have been set at $56.56 under the Defense Appropriation bill. The bill actually sets no specified per diem rate, but under existing law, unless a different rate is provided in the annual appropriation measure, the rate is based on the highest daily salary payable to a Federal employee under the General Schedule of rates. This presently amounts to $56.56.

Highway Upkeep

The President of the American Association of State Highway Officials, R. R. Bartelsmeyer, warned that few people realize the huge upkeep that is going to be required to maintain the divided, multi-laned interstate highways. He told the House Ways and Means Committee maintenance will average $10,000 a mile each year. ▲▲



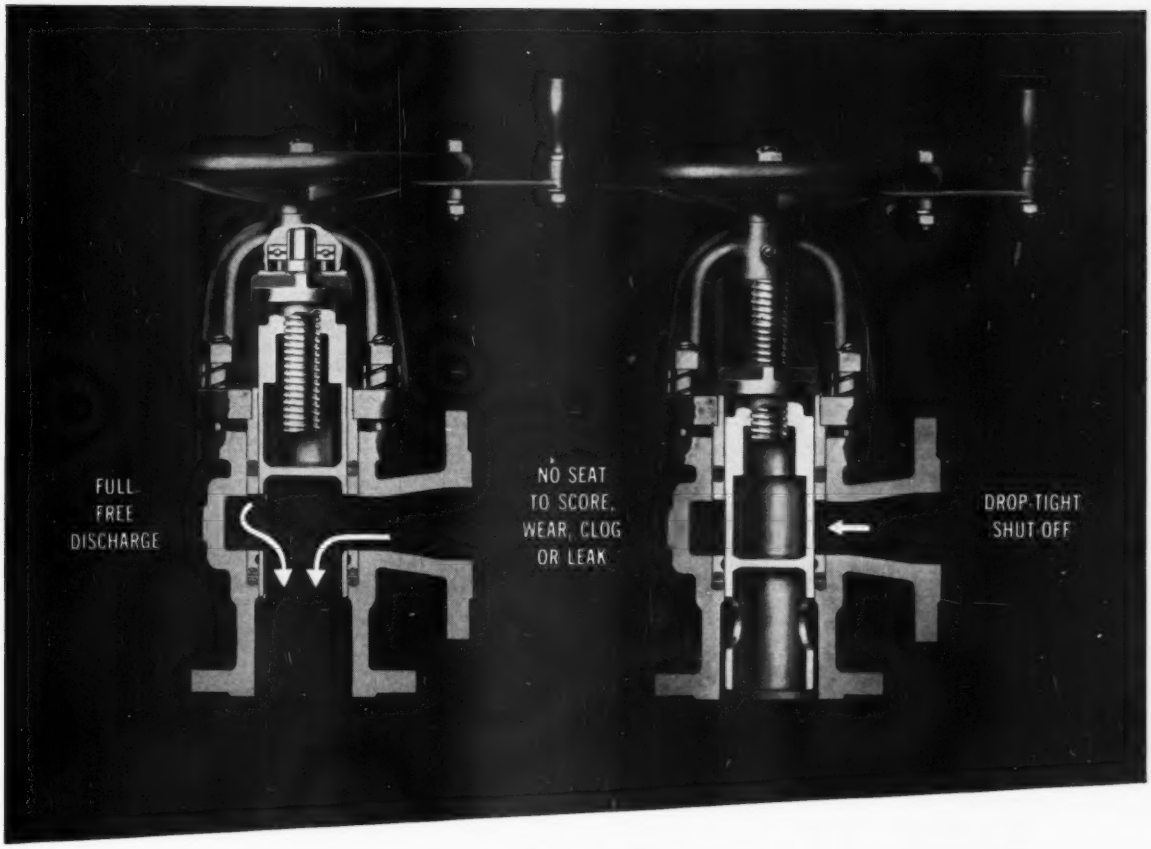
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*Patents Pending

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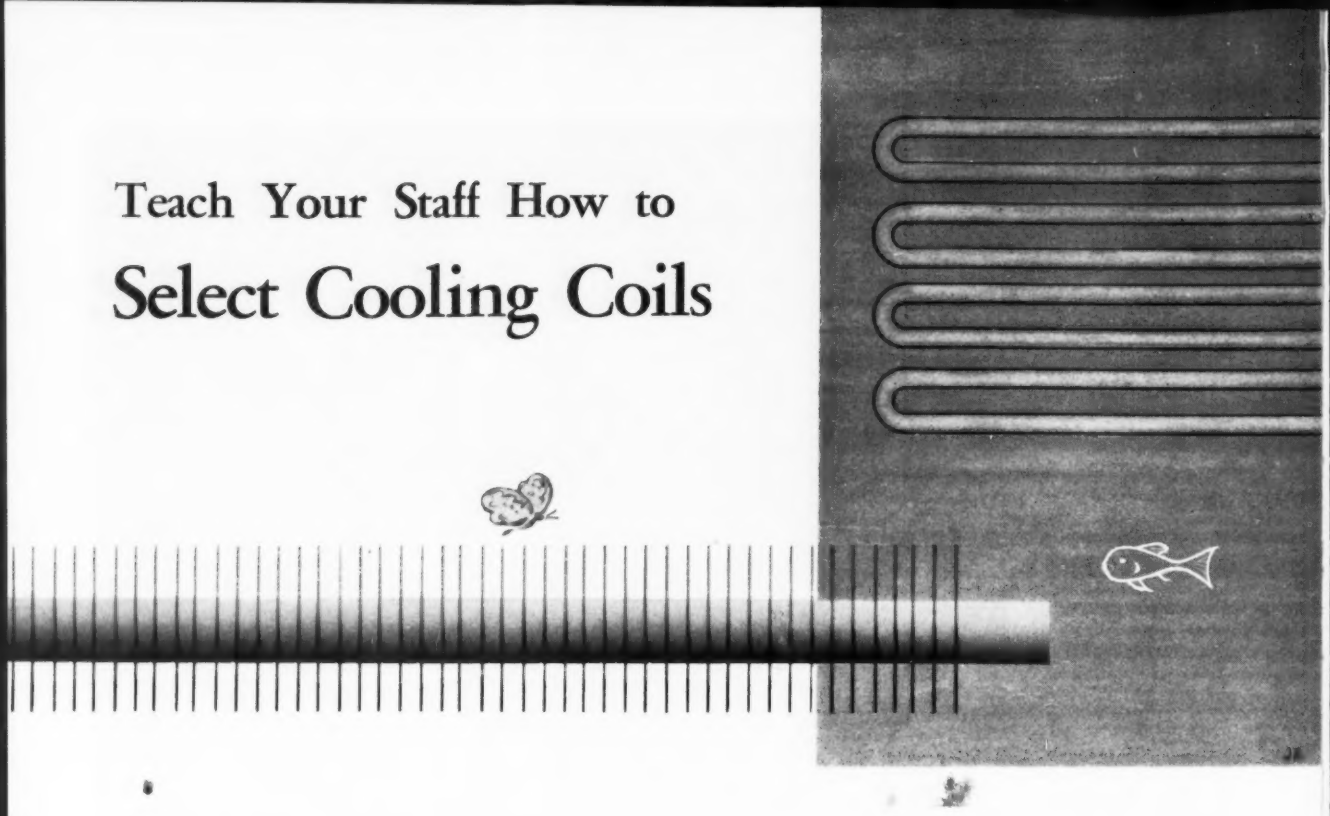
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YARWAY
A MARK OF QUALITY IN STEAM ENGINEERING

Teach Your Staff How to Select Cooling Coils



DONALD E. McLEOD, Chief Mechanical Engineer
West America Engineering Company, Inc.



Donald E. McLeod received his B.S. in Civil Engineering in 1931 from Lafayette College, located at Easton, Pennsylvania. By 1937 he had decided to specialize in the field of air conditioning, and has practiced in this area almost ever since, except during the war years when McLeod was in charge of the design of experimental and production machinery for a precision rubber molding factory. He returned to San Francisco in 1946, where he resumed his activity in the field of air conditioning. He has had responsible charge of the mechanical design of industrial plants, office buildings, hospitals, schools, and commercial and institutional projects. He is a registered mechanical engineer in California and a member of the Commonwealth Club of California. As a member of ASHRAE he was general chairman of the Region X, 1959 Convention, and is a past local chapter president.

CE *exclusive*

ONE OF THE MAJOR COMPLAINTS about air conditioning systems is that they do not provide enough air. This results in space that is too warm, and too humid or too dry. Frequently the basic cause is poor selection of cooling surface by the designing engineer. This often is a result of a misunderstanding of the fundamentals of coil selection for cooling and dehumidifying applications.

The correction of an existing system can be an exceedingly expensive procedure. Reselection of the coil alone will not always correct the system. It may be necessary to replace the water chiller or condensing unit, and the cooling tower or evaporative condenser as well.

The prevention of trouble in a system is, however, a simple and inexpensive matter. All that is required is the selection of the correct amount of surface for the cooling coil, the use of the proper refrigerant temperature, and the matching of system components to the work that the coil is inherently capable of doing.

When the designer determines his air quantity for the space to be conditioned, he does so on the basis of the sensible heat load of the space. He then selects a cooling coil that will do the sensible work required of it and, at the same time, will do

the total amount of work required. As coils work only on total heat, it is essential to select the correct amount of surface for the required duty.

Too many times designers select an arbitrary refrigerant temperature and then solve for the number of rows of coil (amount of surface) required to do the total work. If the selected refrigerant temperature is lower than the proper one, the solution calls for too little surface. In this situation, too small a proportion of sensible work is done and the air from the coil is at a higher dry bulb temperature than the design specifies. Then the space is too warm and too dry.

If the selected refrigerant temperature is higher than the correct one, the solution calls for too much surface. Under this condition, if the chiller or condensing unit is selected on space load, the coil can do more work than the chiller can handle, and the refrigerant temperature may rise even higher. The end result is space that is too warm and too wet.

There are several methods in use for calculating the required amount of surface, or number of rows, for any given set of entering and leaving air conditions. Any of these methods will give an accurate indication of how much surface is required. If a coil manufacturer cannot or will not provide data for surface calculation by one or another of these methods, we do not specify or accept his coils.

Bypass Factor Design Method

Perhaps the most widely known is the bypass factor design method. It is described in the ASHRAE Guide, and generalized factors are given for face velocity and rows of surface. However, this factor varies with the various methods of fabricating coils, and the factor should be obtained from the manufacturer. The bypass factor is the ratio of the dry bulb air temperature entering the coil minus the dry bulb air temperature leaving the coil to the dry bulb air temperature entering the coil minus the effective coil surface temperature (apparatus dew point), or expressed as a formula:

$$\text{BPF} = \frac{\text{Ent. Air DBT} - \text{Leaving Air DBT}}{\text{Ent. Air DBT} - \text{Eff. Coil Surface Temp.}}$$

Performance Factor Design Method

In this design method the performance factor used by some engineers is equal to 1 minus the bypass factor, which reduces to the formula:

$$\text{PF} = \frac{\text{Leaving Air DBT} - \text{Eff. Coil Surface Temp.}}{\text{Ent. Air DBT} - \text{Eff. Coil Surface Temp.}}$$

Wet Bulb Depression Factor Design Method

The wet bulb depression factor, in this design method, is the ratio of leaving air dry bulb temperature minus leaving air wet bulb temperature to the entering air dry bulb temperature minus entering air wet bulb temperature.

$$\text{WBDF} = \frac{\text{Leaving Air (DBT} - \text{WBT)}}{\text{Ent. Air (DBT} - \text{WBT)}}$$

Dew Point Depression Factor Design Method

In this final design method, the dew point depression factor is the ratio of leaving air dry bulb temperature minus leaving air dew point to the entering air dry bulb temperature minus entering air dew point.

$$\text{DPDF} = \frac{\text{Ent. Air (DBT} - \text{Dew Point)}}{\text{Leaving Air (DBT} - \text{Dew Point)}}$$

Face Velocity

It is seldom that we can select a coil with the precise factor of performance that has been calculated as desirable. For reasons of economy, we usually will want to maintain the coil face velocity between 400 and 600 fpm, the 400 fpm lower limit to prevent excessive coil size and the 600 fpm upper limit to prevent moisture carry-over and possible high air friction. If the coil manufacturer desires a lower high limit, we stay within it. Within these limits, we select the number of rows and the fin spacing that approximates our calculated factor and then adjust our load calculations for the actual work our coil will do.

Entering Water Conditions

We are now ready to calculate our entering water conditions. There are two rational approaches to this problem. We normally use one method as a check on the other.

In the first approach, we calculate the required entering water temperature from the empirical formula. This states that the equivalent surface temperature or apparatus dew point is the arithmetic mean of the entering water temperature and the leaving air wet bulb temperature.

$$\text{ADP} = \frac{\text{Ent. Water Temp.} + \text{Leaving Air WBT}}{2}$$

or restated:

$$\text{Ent. Water Temp.} = 2 \times \text{ADP} - \text{Leaving Air WBT}$$

Having determined the entering water temperature, it is only necessary to assume a water quantity with a reasonable temperature change – generally between 8° and 12° – and then circuit the coil for a water velocity that will deliver the required amount of total heat.

In the second approach, we assume a water quantity within the temperature range limits just de-

scribed. We then circuit the coil to achieve a water velocity within the limits recommended by the manufacturer – generally 2 to 8 fps – and calculate the required log-mean temperature difference, then the required entering water temperature.

By either method, it may be necessary to adjust water quantity up or down following the first assumption to make the coil work equal to that required of it. The slight amount of extra time involved in this type of coil selection will be amply rewarded by the satisfaction of having designed a job that will perform as originally specified.

Instruction Sheets Help

Each mechanical designer or engineer who enters our employ is issued a step-by-step instruction sheet giving the methods we require for the selection of cooling coils. The information included on this sheet is listed in Table 1 as a convenience to other consulting engineers with similar problems. ▲▲

Table 1 — Instructions For Selecting Cooling Coils

1. Given the outdoor and indoor design conditions, the heat gain calculations, and the required air quantities.
2. Determine the dry bulb and wet bulb conditions of the entering air by calculation or graphically on a psychrometric chart (EADB and EAWB).
3. Determine the dry bulb and the wet bulb conditions of the air leaving the coil (LADB and LAWB).
   NOTE: In conventional systems, allow 2° rise for ducts and motors. In high velocity systems, allow 3° to 5° rise for ducts and motors.
4. Graphically determine the apparatus dew point (ADP).
5. Determine the sensible heat ratio:
$$SHR = \frac{\text{Change in Sensible Heat}}{\text{Change in Total Heat}}$$
6. Calculate the entering water temperature required for the load:
$$EWT = 2 \times ADP - LAWB.$$
7. Water temperature rise (DT_w) will be between 8° & 12° – normally assume 10°.
8. Calculate total coil heat:
   $H = Cfm \times 4.5 \times$ change in total heat
9. Calculate water quantity:
$$Q_w = \frac{H}{DT_w \times 500}$$
10. Select the number of rows of coil required by one of the following methods:
    a. By the bypass air factor method when using Carrier or Aerofin coils.
    b. By wet bulb depression factor method when using McQuay coils.
    c. By dew point depression factor method when using American Blower coils.
11. Assume a standard coil size with a velocity between 400 and 600 fpm.
12. Determine METD on charts or calculate:
$$METD = \frac{GTD - LTD}{\text{Log}_e \frac{(GTD)}{(LTD)}}$$
13. Calculate required "U" factor:
$$U = \frac{H}{\text{Rows} \times \text{Face Area} \times METD}$$
14. Circuit coil as required to obtain this "U" factor. V_w should be about 2 to 5 fps.
15. Change DT_w and coil area if required and reselect to obtain desired results.

From the actual coil work calculated, select the chiller or condensing unit, and then the cooling tower. The end result is a system of matching components. This procedure will insure a satisfactory operating job if the following precautions are observed:

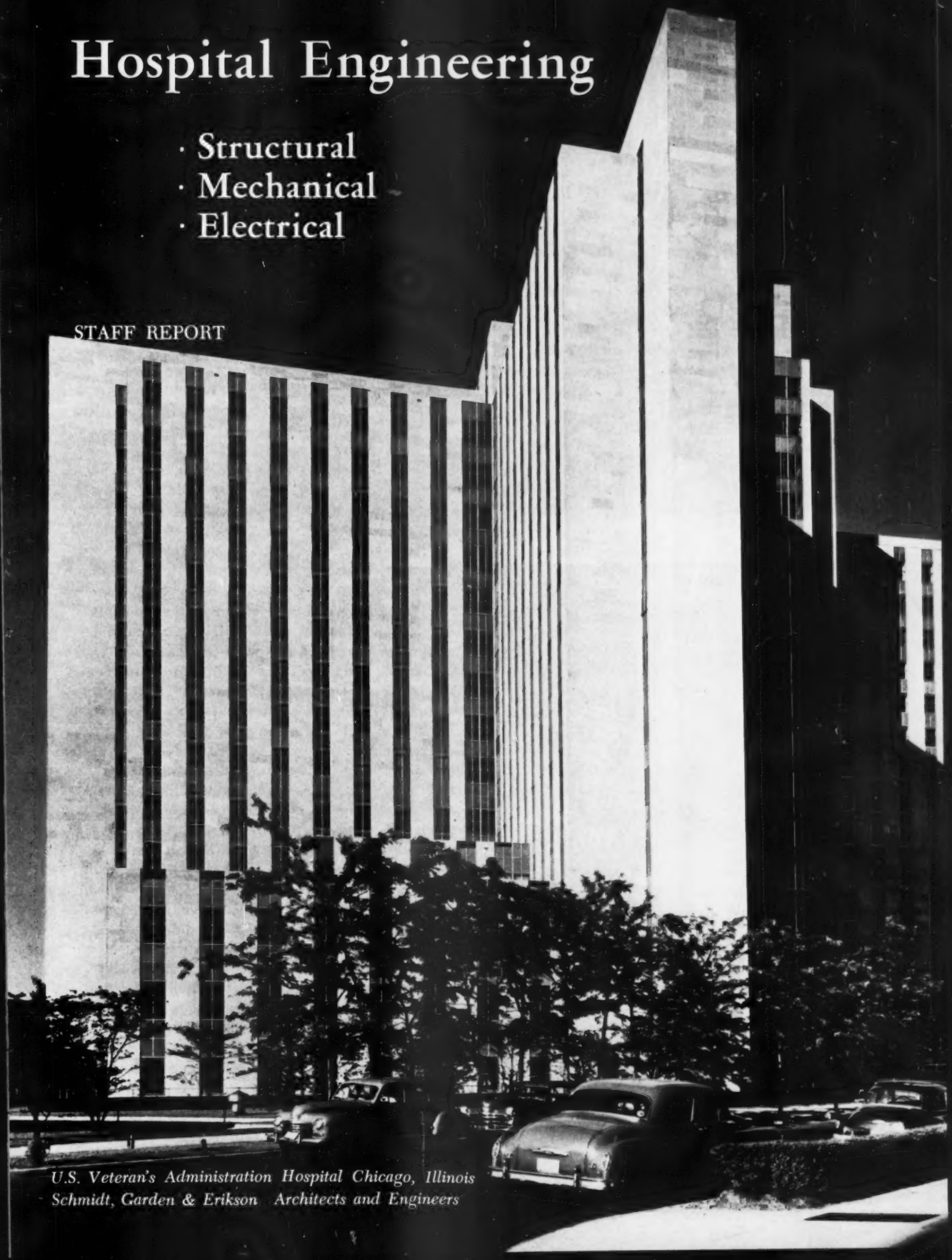
¶ Be sure to include the fan motor load in your coil calculations. Even when the motor is not in the conditioned space or in the air stream, about 88 percent of its energy is chargeable to the air, since the work done on the air raises its temperature.

¶ With calculations based on counterflow conditions, be sure that the piping diagram is arranged to show counterflow connections and, above all, see to it that the contractor follows the plans and specifications exactly when installing the equipment.

Hospital Engineering

· Structural
· Mechanical
· Electrical

STAFF REPORT



U.S. Veteran's Administration Hospital Chicago, Illinois
Schmidt, Garden & Erikson Architects and Engineers



Ebner Associates, formerly The Firm of Edward E. Ashley, Consulting Engineers, handled the design and specification of all mechanical and electrical facilities for this Veteran's Administration Hospital at Wilkes Barre, Pennsylvania. Architects were Kelly and Gruzen. Outbuildings are served by steam lines from central coal burning boiler plant. Since walks form roofs of steam line tunnels, they are free of snow and ice in the winter.

THE HOSPITAL BUILDING BOOM, which started about 10 years ago under the stimulus of the Hill-Burton Program, is still under way. Over $3.6 billion has been spent on 4315 projects. The Federal government has contributed a little more than $1.1 billion of this total amount.

CE exclusive

Since 1948, the cost per bed for new hospital construction has almost doubled. It now hovers around $20,000 for a fully equipped, up-to-date general hospital, including surgery and obstetrics.

Annual costs of running the hospital have risen too. According to the American Hospital Association, the average number of hospital employees per patient in 1948 was 0.76 for all types of hospitals. By 1958 it had risen to 1.07. In the general hospital it had risen to 2.18.

Under these conditions it is a tribute to civic leaders that any hospitals are being built at all. Yet the Hill-Burton Report indicates that 1157 were under construction and 322 had received initial approval at the beginning of the year. The need for hospitals is growing as rapidly as the financial problems besetting them. And so rapid has been the development of new concepts in the field that consulting engineers consider hospitals built more than five years ago to be obsolete.

In this setting, consulting engineers and architects can look at the hospital project as a frustrating chore or a creative challenge – or both.

The Warren Hospital of Phillipsburg, New Jersey is a good example of creative engineering. By close cooperation between Samuel Adams Bogen, consulting engineer, and Frederick G. Frost Associates, architects, the cost per bed was held to only $10,000. This was not accomplished through the elimination of major services, but rather through careful attention to minor details. For example, all mechanical and electrical systems were designed with extreme care to eliminate any excessive capacity or fringe equipment not absolutely needed.

Important as they are, construction costs alone are not the solution to the hospital's financial problems. Raymond W. Garbe of Schmidt, Garden & Erikson, architects and engineers points out, "The high cost of hospital care frequently is pushed off on poor administration. However, it is a fact that the American hospital administrator is the world's finest. For some time he has recognized the need for labor saving devices. The architect and engineer must provide them, even if they push up initial costs. Annual costs of operation sometimes run as high as 30 to 40 percent of the original capital investment. We can no longer ignore them."

Another facet of hospital design sometimes overlooked by the consultant is the psychological implication of engineering decisions. E. R. Gritschke, Chicago consulting engineer says, "There are certain accepted engineering standards which we recognize as good, but not of Divine origin. Many surgeons are not happy with the levels of temperature and humidity generally specified for the operating room. In our opinion, it is better to cooperate by designing a flexible system than to deliberately create an unpleasant working environment for the man on whose skill the patient's life depends. At the same time, safety must come first."

Rapid advance in the technology of medicine can have a great effect on hospital space requirements. For example, X-ray facilities currently may occupy as much as 15,000 square feet of floor space where a few years ago 500 would have been ample.

Engineering Affected By Patient Care

Patient care methods also are changing, and making necessary new engineering concepts. Recently the U.S. Public Health Service published a tentative draft of a bulletin *Elements of Progressive Patient Care*. Hospital men hoped these new ideas would reduce annual operating costs, but instead of significant savings, the Service can only promise that the new approach, while better for the patient, will create some serious structural problems for the consulting engineer. Here is what it says in the tentative draft:

"Difficulties arise with the Intensive Care Unit because the bay depth imposed by the requirements of the suggested 6-bed intensive care room is greater than that found in the conventional nursing wing. This bay depth can sometimes be provided by utilizing the end of the wing, in which case the width of the wing becomes the long dimension of the room.

"Existing conditions such as columns and fire stairs sometimes interfere with the use of this space, and in some cases, the one room thus obtained will not satisfy the hospital's requirements for intensive care beds. Where these conditions force the use of the conventional bay depth of from 14 to 16 feet, the resulting 6-bed room will be elongated to the point where the effective surveillance of patients will be necessarily reduced. Some difficulty may also be experienced in providing the storage closet and toilet room shown on the accompanying plans . . ."

Here is evidence that the alert hospital consultant must consider not only the immediate effects of his design, but also how it will lend itself to medical and nursing developments. As another illustration, the need for future expansion is accepted even as a new building is being designed. Thus, the structural engineer must develop his plans to satisfy today's needs and tomorrow's expansion.

Coupled with all these problems is the patient's demand for more care, comfort, and convenience. As one consultant expressed it, "We used to take it for granted that people expected hospital life to be a little on the Spartan side. Today they are disappointed if it is not better than in a luxury hotel."

This public attitude has forced the hospital to provide more private baths, better meals, built in television, complete air conditioning, and a multitude of other features which make no measurable contribution to physical welfare. However, because of their psychological implications, they are rapidly becoming accepted hospital standards.

Most consulting engineers would agree with John Dolio, of John Dolio & Associates, who said, "When the consulting engineer works with the architect on a hospital design, he must be prepared to impose on himself an extremely exacting discipline. The functional, economical, and aesthetic standards for good hospital design are probably higher than for any other building project. In addition, the consulting engineer must pay particular attention to specifications, to be sure that his plans are properly interpreted."



Charles Luckman Associates and William L. Pereira, architects, designed the Valley Presbyterian Hospital with its sun-shaded circular facade for the nursing wing.



Hospital Structural Engineering



Phelps Memorial Hospital at North Tarrytown, N. Y. has structural steel framework designed by Eipel Engineering. Eggers & Higgins, Rogers & Butler were the architects on the project, with mechanical and electrical engineering being handled by the firm of Slocum & Fuller.

NOT TOO LONG AGO, the structure itself was the major cost item in a hospital project. Only three or four years ago it took upward of 60 percent of the over-all construction cost. Today it may run well under 50 percent. This means that the task of the structural consulting engineer is becoming more difficult. His plight can be illustrated by the story of one small town's experience with hospital building.

The local hospital board had done a fine job of campaigning for funds. In the planning stages they were not too interested in the structure, so long as it had the right number and kind of rooms and met state and Federal aid standards. As the planning progressed, the board became more and more involved with the niceties of modern medical practice. Soon the plans were loaded with special equipment. Just as soon, it became evident that there was not enough money available to do the job.

A conference was called with the engineers and architects – and the structural engineer was asked



Grossmont District Hospital incorporates both reinforced concrete and steel framing in its structural design.

to shave construction costs through more economical design. The meeting adjourned when he wryly pointed out that total elimination of the structure would still leave the board short of funds.

This story illustrates the dilemma of the structural engineer. He must take the few dollars left him and not only satisfy the functional and aesthetic demands of the architect but also provide easy and unbroken pathways for air ducts, piping, wiring, and even conveyors. With design changes occurring almost overnight in mechanical and electrical equipment, he may be called upon to alter plans during construction and even anticipate major relocation of equipment after construction is completed.

Engineers and architects are in complete agreement as to the need for flexibility in structural design for hospitals. But final designs must be a compromise between the desired degree of flexibility and the economic limitations of the project.

Since the functional demands of the 100-bed hospital require an increasing number of isolated service units, it is conceded that the best solution is to stack these units in a multistory building. Except for very small plants, there will be no boom in ranch style hospitals.

The typical hospital in today's metropolitan and urban areas is a multistory building, but something less than a skyscraper. Because of this, some structural consultants have developed a strong bias for reinforced concrete framing. They claim it readily meets accepted standards for fireproofing and sound



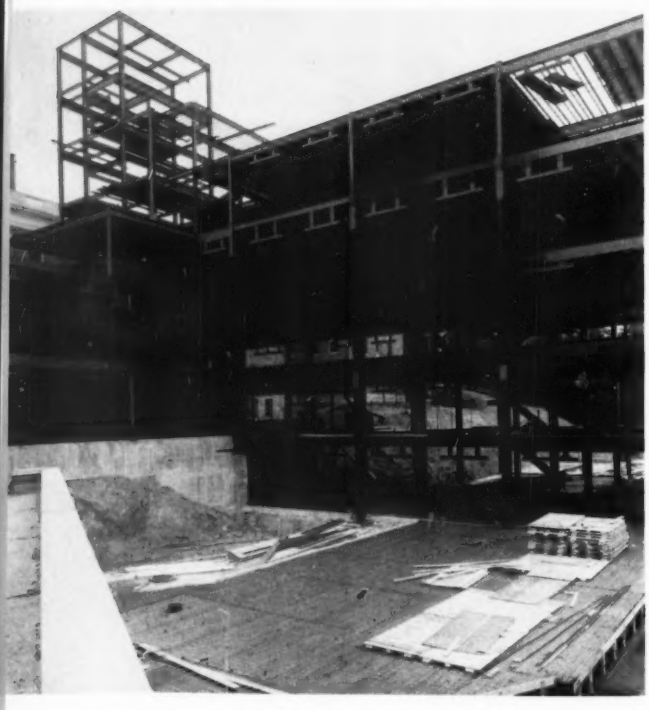
Flat plate construction was used on Kaiser Hospital in Honolulu by James & Honey, structural engineers. Wolff & Zimmer were the architects on the project.



The Warren Hospital of Phillipsburg, New Jersey has exposed reinforced concrete structural members. Architects, Frederick G. Frost Associates; mechanical and electrical engineering handled by Samuel Adams Bogen.



Spartanburg General Hospital in South Carolina was designed by Lockwood Greene Engineers, Inc. Metal pan construction incorporates wide flat beams and columns.



Seelye, Stevenson, Value & Knecht, New York engineers, used bar joists and steel frame on the Danbury Hospital. Rogers and Butler were the architects.

control, and is almost universally the most economical structural system for a building with less than 18 stories. This limit may move up or down a few floors depending on geographical location. On the other hand, many consultants point to the footing problems created by heavy concrete structures and the fact that standardized structural steel components can be low in cost and easily erected. Since contractor experience with various types of construction is also a major cost factor, most consultants prefer to submit alternate preliminary designs to contractors for comparative pricing.

Up until now, hospitals have stuck to the conventional or near conventional. No one in this country has yet been willing to try, or found a real need for, thin shells or folded plates.

Regional Aspects of Structural Design

When discussing structural design with consultants, regional preferences are usually evident. Eipel Engineering, with offices in New York City, has designed a wide variety of hospital structures. However, of the five floor systems they have used most often, three were used exclusively with steel framing and a fourth was used with either steel or reinforced concrete framing.

Lockwood Greene Engineers, Inc., of Spartanburg, South Carolina, has had several recent hospital jobs in which reinforced concrete was used throughout. Several of their designs made use of the modified flat plate system, with wide shallow beams. Exterior columns also were kept broad and thin to blend readily with walls.

Reporting on structural design on the West Coast, John F. Mitchell, of Washington and Mitchell, Inc., pointed out that footing and earthquake problems dictated the structural approach on several recent projects. Reinforced concrete shear walls were used on one job to meet lateral requirements of earthquake conditions. Reinforced concrete design predominates in this area, although some hospitals have incorporated steel framing in operating and service areas.

Federal and state regulations and recommendations have done much to standardize hospital room layout. In the nursing wing of the typical hospital, the corridor is 8-ft wide and rooms may be from 16- to 20-ft long and around 20-ft wide. Column patterns are designed to meet these conditions. However, hospital practice gradually is changing and entirely different room layouts are being proposed. How readily this can be accomplished may depend on the ingenuity of the structural designer.

Recently, the problem of maintenance has been the deciding influence in exterior wall type. The completely fenestrated wall which has been used in some hospitals creates a window washing prob-

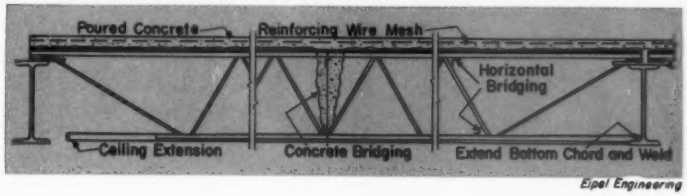
lem which most hospitals simply cannot afford. In the western and mountain states, sun shades are mandatory to control lighting and reduce heat gain when window walls are used. However, except in locations such as operating rooms, there is no trend toward the windowless wall.

Since they now have excellent insulating qualities, panel walls and double or even triple glazed windows are becoming popular. These walls offer light weight, easy erection through prefabrication, and a wide variety of color schemes and textures. Masonry walls are, however, still in the majority. Placing of structural columns outside rather than inside the walls is catching on.

There are a number of structural floor systems for both steel and reinforced concrete framing that lend themselves to hospital design. Noise reduction and fireproofing are primary considerations, with strong emphasis on ease of installation for ducts, piping, and wiring. To a great degree, flooring system selection is affected by local building codes and contractor experience and cost.

Floor Systems Used With Structural Steel Framing

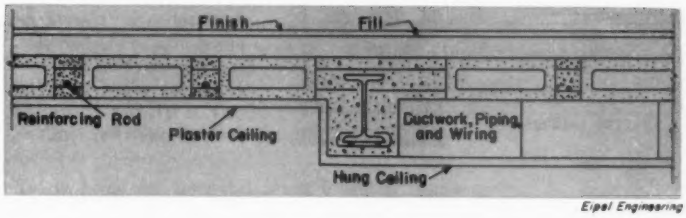
OPEN WEB STEEL JOISTS



Eipel Engineering

Standard joists are available in depths from 8- to 16-in. and offer an extremely low cost design for flat floors and ceilings. The open truss design makes piping and wiring installation easy. On some hospital installations there has been complaint about noise transmission. Addition of solid concrete bridging, as indicated on this detail drawing, seems to eliminate this problem.

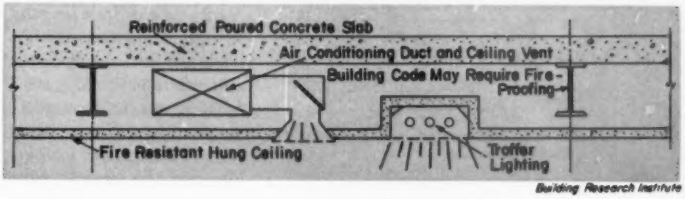
TILE OR SLAG BLOCK ARCH



Eipel Engineering

This system is applicable with both steel and reinforced concrete framing. The arch is usually prefabricated of tile or block with steel tie rods. It is sound and fireproof and may be plastered direct or installed with a hung ceiling. Its flexibility is relatively limited, since any cut in the arch will definitely limit its load carrying capacity. Some consultants say it is more expensive than the open web steel joist.

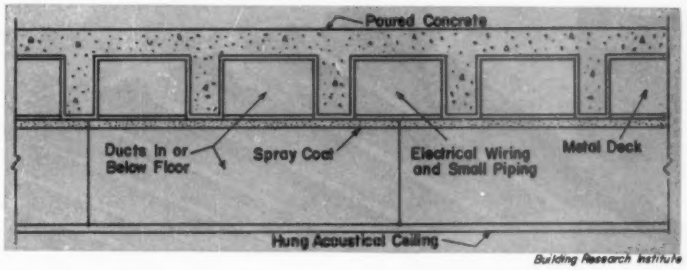
REINFORCED CONCRETE FLAT ARCH



Building Research Institute

This design gives good flexibility since the ceiling may be hung, plastered directly on the slab, or simply painted. Sound transmission is low for any of these ceiling treatments. It is interesting to note that fireproofing of steel members is not required under some building codes, provided a fire resistant ceiling is installed to give protection. This applies to secondary beams only.

CELLULAR (METAL PAN)

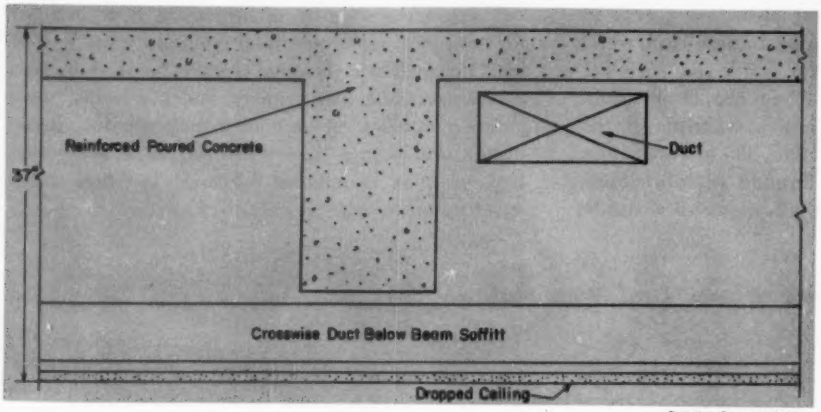


Building Research Institute

This type of flooring is available in a wide variety of standardized forms and offers flexibility of a high degree for wiring, heating, and piping, if this much flexibility is felt to be required. It usually requires a ceiling plus an asbestos fireproofing spray coat. Soundproofing quality is excellent. Original patents on this flooring system have already expired and the many systems offered are extremely competitive. When lightweight concrete is used, the system offers a good weight saving.

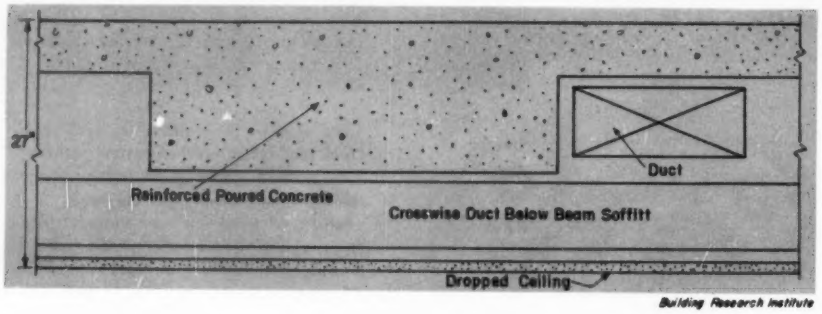
Floor Systems Used With Reinforced Concrete Framing

SLAB AND BEAM



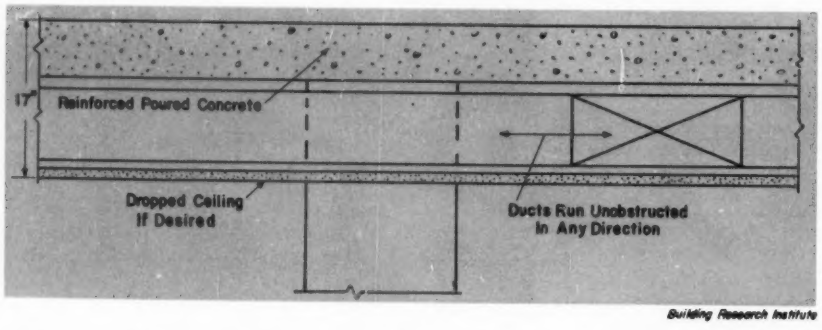
Conventional deep beams in reinforced concrete design are gradually being eliminated. Note saving in vertical height achieved with designs below. This can save a full floor height in ten with flat plate construction. In addition, it is recognized that the deep beam is more seriously affected structurally by cuts or indentations. The time is not far distant when this design will be considered obsolete for structures such as hospitals with only medium floor loads.

SHALLOW BEAM AND SLAB



Wide shallow beams offer a compromise between the conventional design above and the flat plate below. Sometimes called the slab band, this design lends itself to hospital wings on some occasions, with the wide flat beam running over closets on either side of the corridor. It is obvious that the wide beam can more easily be cut without concern for structural failure.

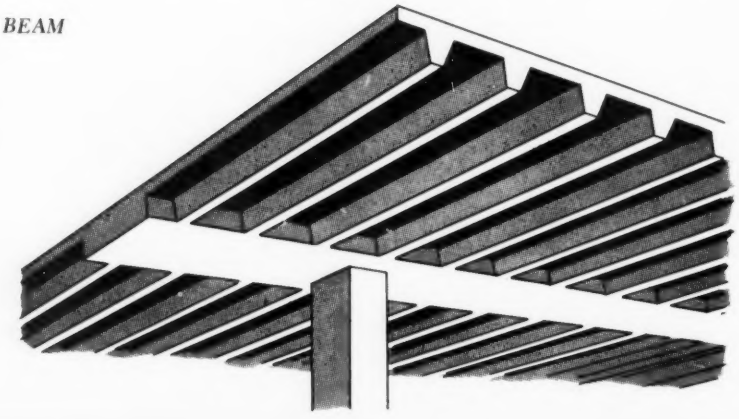
FLAT PLATE

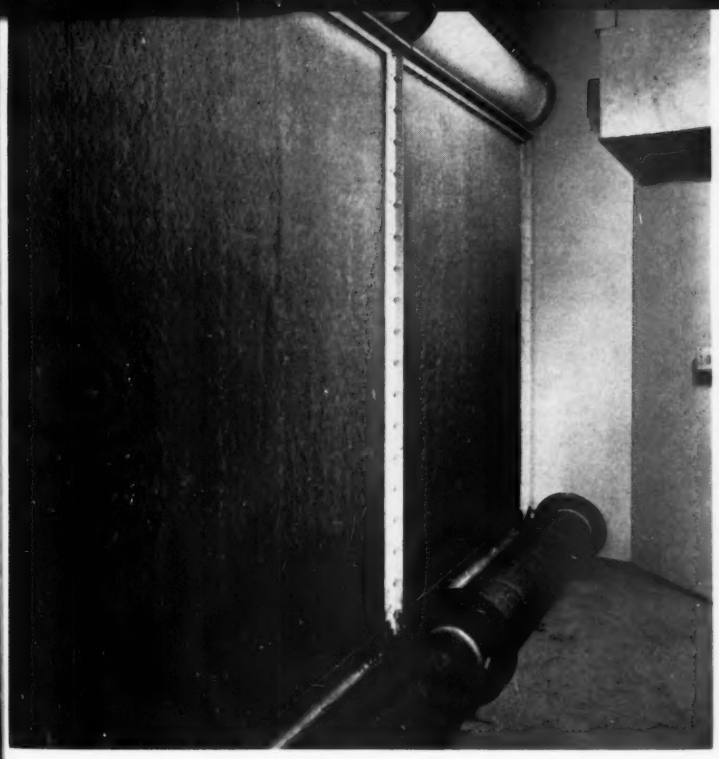


Flat plates offer the advantage of allowing pipes and ductwork to run freely in any direction. Thus, there is frequent opportunity to cut duct lengths to minimum distance. In addition, column spacing can readily be staggered to meet special layout arrangements. Form costs for this design are usually low and the smooth surface left after their removal is often painted.

RIBBED FLOOR WITH SHALLOW BEAM

The advantage of this design with a deep joist is its ability to span longer distances and hence reduce the number of column bays. The conventional hospital wing with central corridor and rooms on each side is one type of layout in which this construction is advantageous, as the center to center column spacing can be 25 feet or more.





Hospital Mechanical Engineering

Hospital filter systems usually use both electrostatic and media filters. Roll type media filter shown automatically exposes clean surface as needed.

AIR CONDITIONING is the simultaneous control of temperature, humidity, motion, distribution, dust, bacteria, odors, and toxic gases, most of which affect, in greater or lesser degree, human health or comfort. If we accept this definition, there can be no question of the importance of air conditioning in hospital design.

However, the hospital is made up of many units, all demanding special conditions. For surgical and obstetrical suites, it generally is conceded that recirculation is undesirable, so 100 percent make-up air usually is incorporated in the design. For the nursing wing, recirculation of a certain percentage of room air is permissible although movement of air from one room to another through the ventilating system must be avoided. At the same time, there are varying requirements for humidity, temperature, and other factors which must be met in other hospital areas.

Thus, hospital air conditioning is almost as controversial among engineers as it is popular with patients and personnel.

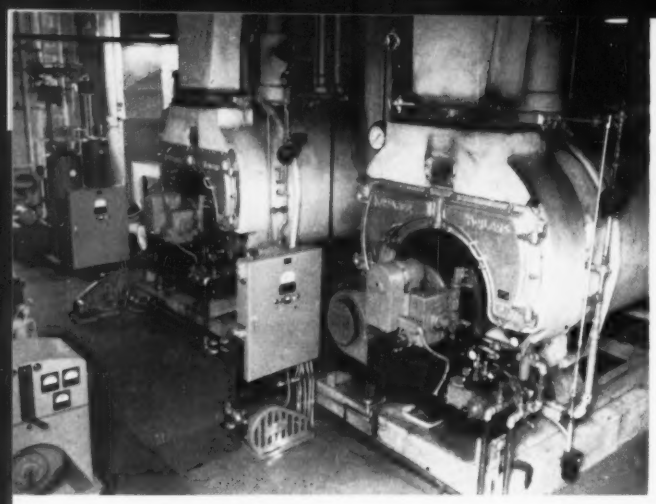
Ventilating System Requirements

Regardless of whether cooled air is circulated in the summer season, all hospitals require ventilating systems. More and more, the window is being treated as a barrier against the outside atmosphere and remains only as a visual contact with the outside world. In fact, the windowless operating room is almost an established fact.

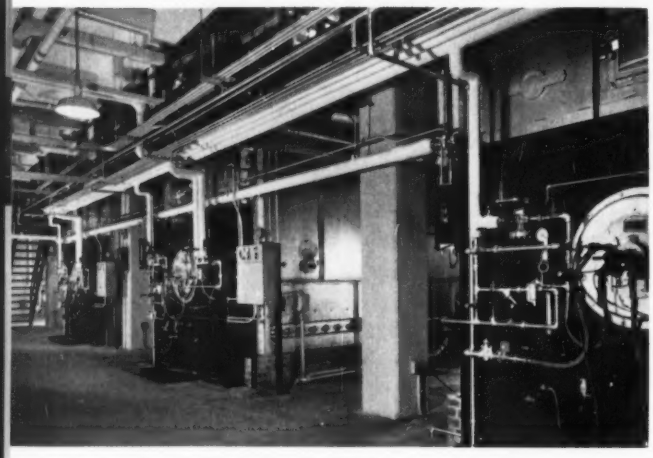
The first requirement of the hospital ventilation system, according to E. R. Gritschke, Chicago consultant, is clean ductwork, particularly in surgery and obstetrics. This means that access must be provided for manual cleaning, or the system must be shut down and fumigated at intervals frequent enough to prevent the buildup of harmful bacteria. If these precautions are not practiced, it is con-



Electronic filters follow renewable media filter to provide thoroughly cleaned air for hospital ventilation.



Two oil fired, 125-psig boilers serve Kershaw County Hospital. Each oil pump is sized and piped to serve both boilers. Standby power plant is in left foreground.



Slocum & Fuller, consulting engineers, designed this new boiler plant to serve the Methodist Hospital of Brooklyn. It has enough capacity for future expansion.



Columbia Hospital addition will have 50-hp, gas fired heating boiler in penthouse. Mechanical engineering by James R. Dodson, Jr.; architects, Prack and Prack.

ceivable that the patient entering the hospital with a broken leg could mysteriously die of pneumonia.

Considerable attention has been given in recent years to the spread of bacteria from one patient room to another. Some Public Health officials recommend a positive hall pressure to be sure that air does not leave patient rooms and spread through the corridors. However, many consulting engineers look at the hall as a natural plenum, and prefer to use it for return air. Regardless of the design approach, it is important that a proper flow of air be maintained to reduce odors and prevent the spread of bacteria. It is up to the engineer to determine how this can be done most effectively.

The most obvious treatment of outside or recirculated air going into the ventilating system is filtration. Since bacteria frequently ride dust particles, it is a case of stopping the horse to get the jockey. This can be done with conventional spun glass media, which can be replaced when dirty, with an electrostatic filter system which can be manually or automatically cleaned, or with a combination of the two. Absolute filters are available with efficiencies close to 100 percent, but many engineers feel that their maintenance is excessive.

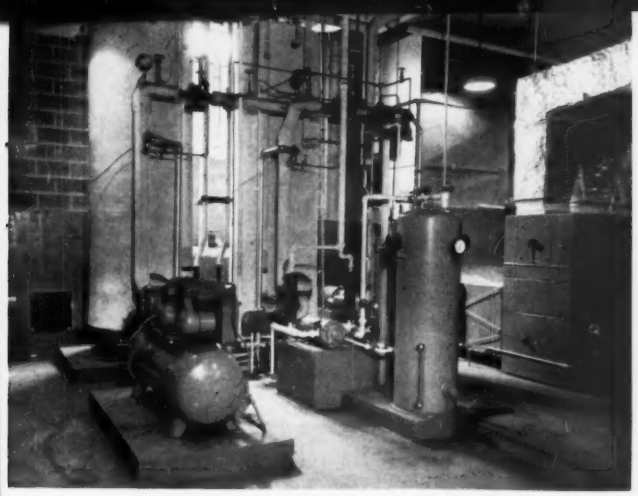
Humidity control is also important in hospital ventilating systems. This is sometimes accomplished with a water spray to which disinfectant has been added to aid in bacteria control. These water sprays also are used to wash out odors.

Hospital Boiler Plants

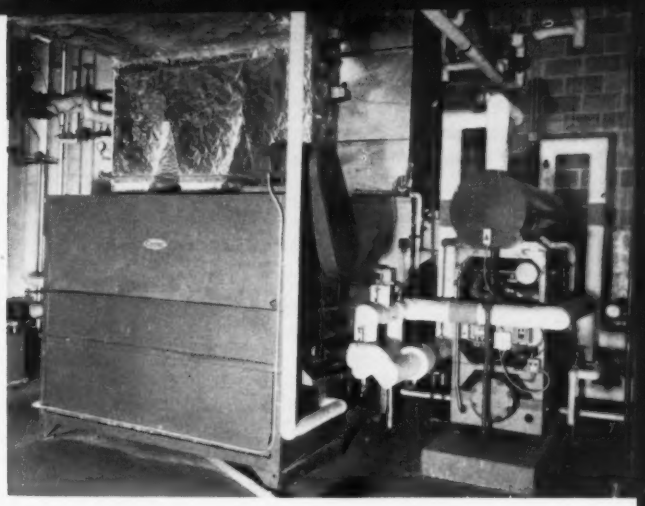
In most modern hospitals, the ventilating systems and the attendant filtering and humidity controls are incorporated as a part of the air conditioning system. For most areas, heating of air is required regardless of whether a complete air conditioning system is provided. This requires a boiler plant capable of burning gas, oil, or coal to either heat water to a high temperature or convert it to steam.

Boiler plant capacity is affected by many other needs than heating. For example, with the absorption refrigeration system, it makes possible the chilling of water for air cooling. It also must serve the laundry, sterilizer, and other facilities.

Boiler plants usually are isolated from the hospital as much as possible, with larger plants being located in separate buildings. Fuel selection is affected by a number of factors, but the primary one is cost. It is common practice to provide for the use of at least two fuels in modern plants; first, for standby service in case of fuel shortage or equip-



Kershaw County Hospital in South Carolina uses basement location for air compressor, vacuum pump, hot water tanks and air conditioning unit for surgery.



Lockwood Greene Engineers, Inc. specified this air conditioning unit with all outside air, electronic and fiberglass filters, and reheat for zone control of temperature.

ment breakdown, and second, to allow for changeover when there are changes in the fuel market.

The boiler room, with its auxiliary equipment such as feedwater pumps, is frequently a noise and heat source. Thus, while isolation helps to avoid transmission of both heat and mechanical noise to the patient area, it is important that the boiler room be properly ventilated and equipment selected which will operate quietly, without vibration.

Air Conditioning for the Hospital

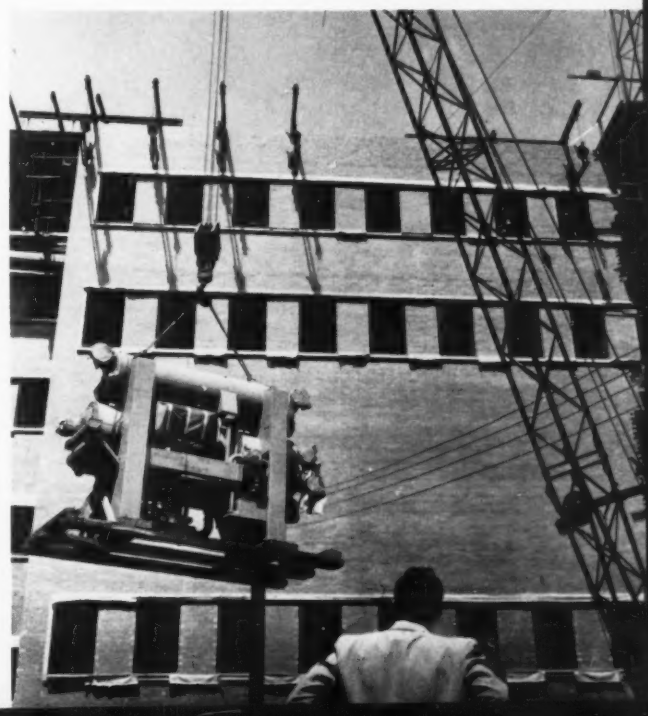
For a number of years, the surgical and obstetrical rooms have been fully air conditioned. Accepted standards in the past dictated the use of 100 percent outside air with room conditions maintained at 80 F and a minimum of 55 percent humidity. Current standards are more flexible, and the consultant who adheres to the old limits is almost certain to get complaints from the doctor and his staff. Some leading surgeons demand temperatures as low as 68 F with humidity in the 50 to 55 percent range. The engineer who refuses to compromise will find that it does not take long for even a doctor to learn to manipulate either a maintenance man or a thermostat to get more comfortable ambient conditions.

High humidity standards were established as a safety measure for areas in which explosive anesthetic gases were used, but current research indicates that high humidity is no sure guarantee against static sparking. It also has been demonstrated that recirculated air and outside air can be blended to give reasonable protection against explosive concentrations of anesthetic gases. Further, patients seem to recover more rapidly, according to some doctors, when subjected to cooler operating temperatures. Thus, air conditioning standards are a subject for serious debate among surgeons.

Meanwhile, the static electricity problem has been greatly reduced by means of semiconductive flooring, ungrounded electrical circuits, special shoe sole and heel construction, and newer synthetic fabrics which do not become statically charged.

One positive statement can be made about surgical and obstetrical air conditioning requirements. Consulting engineers agree that it should be either an entirely separate system, or zoned so that each unit can be independently controlled.

From an engineering point of view, consultants believe that hospital air conditioning generally



Steam absorption refrigeration machine is being hoisted to penthouse location at Columbia Hospital. The 100-ton unit keeps summer boiler load at efficient level.

could be handled most economically by circulating less conditioned air at lower temperature and humidity. However, in areas such as the nursery, some doctors feel that high humidity has definite advantages. In other areas, the problem becomes purely psychological. Thus, it is the engineer's task to compromise engineering economics with the physiological and psychological needs of patients, doctors, and staff.

Mechanical consultants generally agree that the new hospital air conditioning system can be served best through a central refrigeration system. This does not mean that separate refrigeration units will not be used to serve special areas – and this does not always apply to alterations and additions.

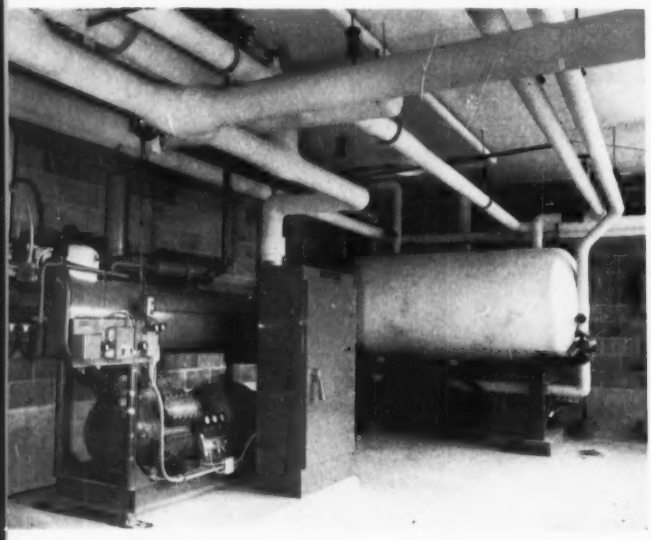
The engineer must choose between the absorption and the electric motor driven compressor system for central refrigeration. The decision must be based on an economic study of the summer cooling load in relation to the cost of electricity and fuel.

Fuel availability and prices can be discussed only in terms of local conditions. Leading consultants in the Chicago area say that with gas as the fuel, they need a stable price of around 3½ cents per therm, or less, to justify an absorption system operating on boiler room steam. Any rise in gas prices would tip the balance in favor of an electric motor driven compressor system. Currently, coal and oil cannot compete with summer rate gas, on a price basis, in Chicago. However, just a few miles away in the coal producing areas, the logical cost comparison would be between a coal fired boiler supplying steam to an absorption system and an electric motor driven compressor.

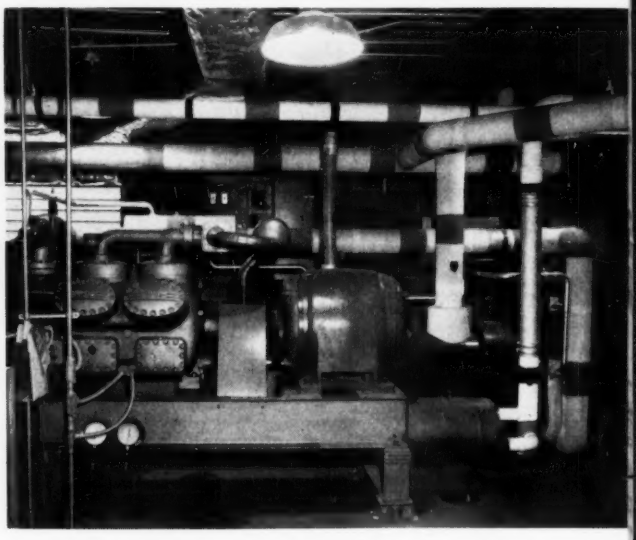
Another factor affecting summer air conditioning is the summer boiler load for laundry and other services requiring steam and hot water. If a boiler must run all summer at low load, throwing in the air conditioning requirements may bring it up to a more efficient operating level. These and other economic problems, however, differ little from those involved in the design and selection of any air conditioning system. Competitive bids, carefully authenticated by the consulting engineer, usually provide the answer.

In terms of the mechanical equipment itself, the absorption system is conceded to be quieter. Centrifugal equipment is designed for quiet operation, but it sometimes develops a high pitched whine when operated at loads of less than 20 percent of capacity. One Midwest consultant made the general statement that manufacturers had not devoted sufficient attention to the noise problem. He did not limit his criticism to air conditioning equipment, but included the entire power and mechanical system. It was his opinion that European manufacturers have shown considerably more interest in this problem, and therefore hospitals abroad are built to much lower noise level specifications.

Consultants differ on the economics involved in setting an upper limit on the refrigeration load for a reciprocating compressor. Some believe that a 150-ton system is the dividing line, with higher loads being assigned to the centrifugal compressor. However, there seems to be a growing tendency to specify the centrifugal unit, even on light loads. Under these circumstances, its initial cost is generally higher. For example, on one recent 100-ton



This 50-ton water chiller uses a reciprocating compressor. Note vibration isolators on the suspended piping.



Penthouse location was selected for this 100-ton water chiller. Equipment is mounted on vibration isolators.



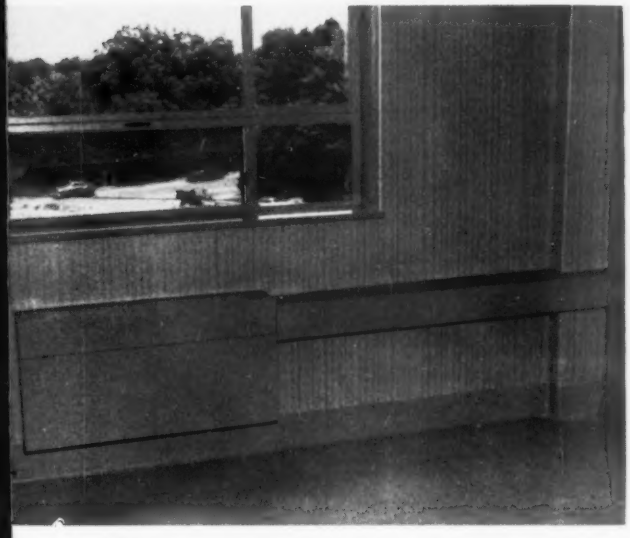
In-progress photo at Spartanburg General Hospital shows high pressure primary air ductwork and insulated water piping in corridor ceiling. Fluorescent troffer lights are in place, ready for installation of acoustical tile.

installation, two reciprocating compressors connected in parallel not only cost about $3800 less than a single centrifugal unit, but gave better performance under fluctuating load conditions. It is generally conceded that above 200-tons capacity the centrifugal compressor is superior.

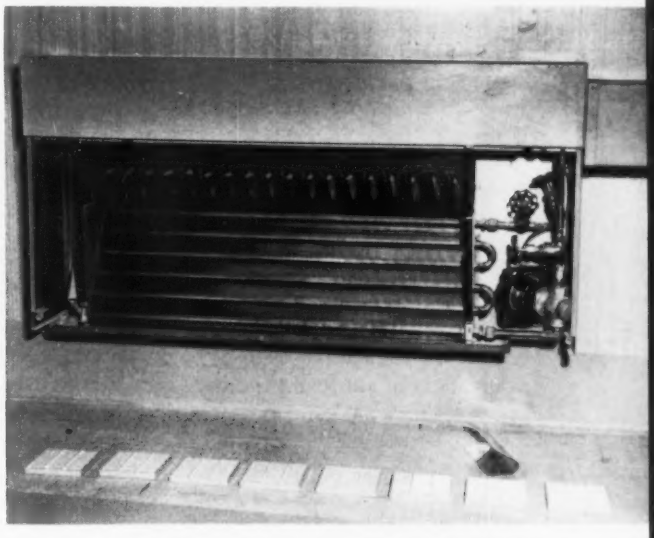
The central conditioned air source, without room coils for secondary cooling or heating, is not readily adaptable to general hospital use because of the danger of cross-contamination, unless 100 percent outside air is used. It is, for this reason, uneconomical for general use, but frequently is used for specific areas, such as the nursery and surgery. Central systems can be designed with a room mixing device with local fan for recirculation of room air, but normally this is not an economical procedure. The conventional one-source central air conditioning system is also objectionable for hospital rooms for it usually has no individual controls.

For air conditioning the nursing wing of the hospital, consulting engineers are using a central refrigeration system with chilled water units for cooling in the individual rooms and a unitary-central air system in basement or penthouse location. Since most of these applications are year round perimeter systems, induction or fan-coil units can be used in the rooms with cold water circulation in summer, hot in winter. Dual duct systems are also used.

The fan-coil unit is the least expensive of these room units, since it can be installed without a pri-

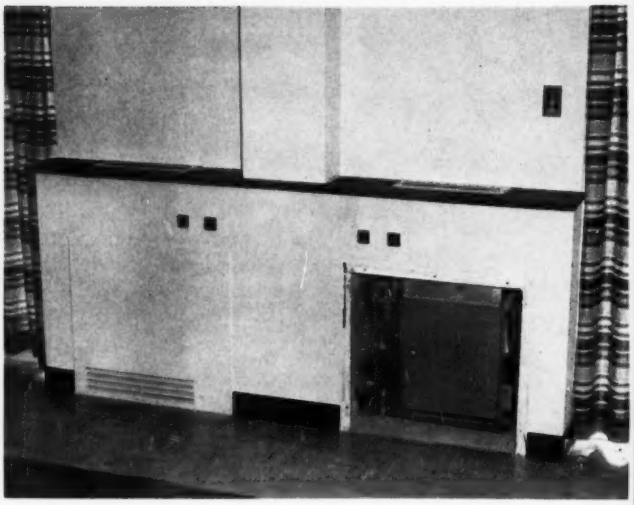


Typical application of induction type air conditioning unit installed with single duct exposed in patient room.



Induction unit with cover and vents removed to show water piping and air supply enclosed in metal runout.

Two built-in fan-coil air conditioning units cool with chilled water in summer, heat with hot water in winter.



mary air duct by simply providing a grilled opening in the building wall. The fan will draw in fresh outside air and recirculate room air, with a damper controlling the mix. Air passes through a filter before going over the coils. A drip pan and drain must be provided for condensation during the cooling season. The fan-coil unit also may be used with a primary air supply, thus eliminating the outside wall opening and providing for greater conditioning control. Usual control is through manual or automatic water flow control, although variable fan speed is sometimes used.

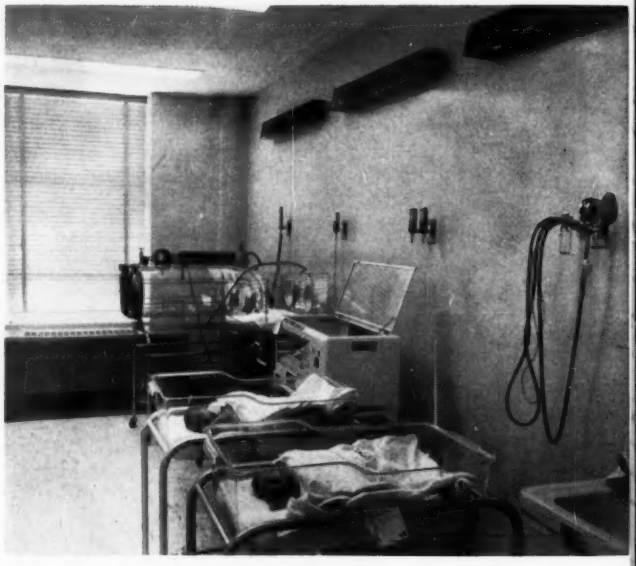
The fan-coil unit is not as versatile as the high pressure induction unit, and some hospital planners object to the placement of mechanical equipment such as fans in individual rooms. With separate hot and cold water coils, however, the units can provide the simultaneous heating and cooling required for intermediate seasons in multiroom buildings.

The high pressure (relatively speaking) induction system uses a single coil for heating and cooling, with primary and room air mixing in ratios from one-to-three to one-to-five. The high velocity jet of primary air induces a good flow of room air through the unit, and allows for heating, cooling, and off-cycle service such as required when one side of a building is heated by the sun while the opposite side requires system heat. Baffled plenums are lined with a sound absorbing material to dampen noise. Capacity of the unit usually is controlled by manual or automatic valves which set the rate of water flow through the coil.

Chief advantage of the high pressure induction system is the small ducts required, since a reduced amount of primary air is flowing at high velocity. Except for damper and control mechanism, there is no need for maintenance service on the unit in the room, although periodic cleaning should be scheduled. It provides extremely versatile service for year round conditioning in almost any climate. It is, however, more expensive than the simple fan-coil unit, under most circumstances.

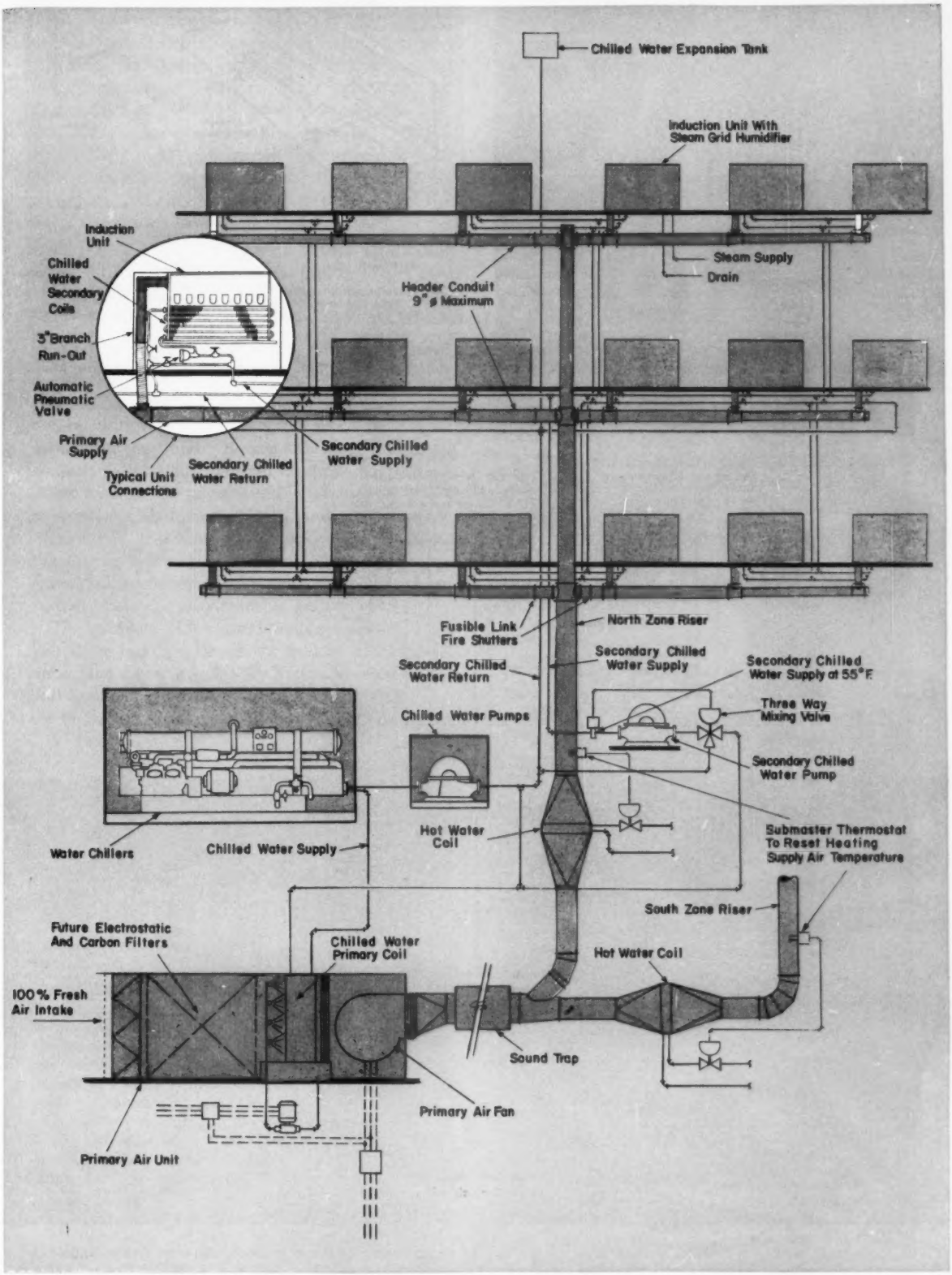
The low pressure induction unit achieves a mix ratio of primary and room air of from only one-to-one to one-to-two. Normally it operates with only a heating coil, since the primary air is cooled to below room temperature. It is not as versatile as the high pressure induction unit and requires larger ductwork, hence is frequently more costly.

The dual duct system is another approach that may be used in hospital air conditioning. It involves the use of a double duct system, one for warm, the other for cold air, with a blending and sound at-



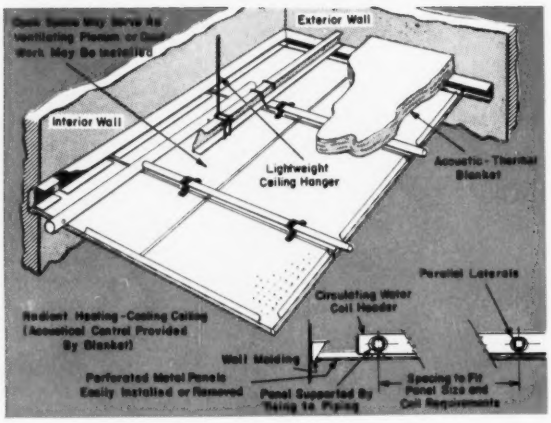
Custom-built unit provides ventilation air and maintains constant temperature and relative humidity in nursery. Note oxygen outlets and germicidal lamps on room walls.

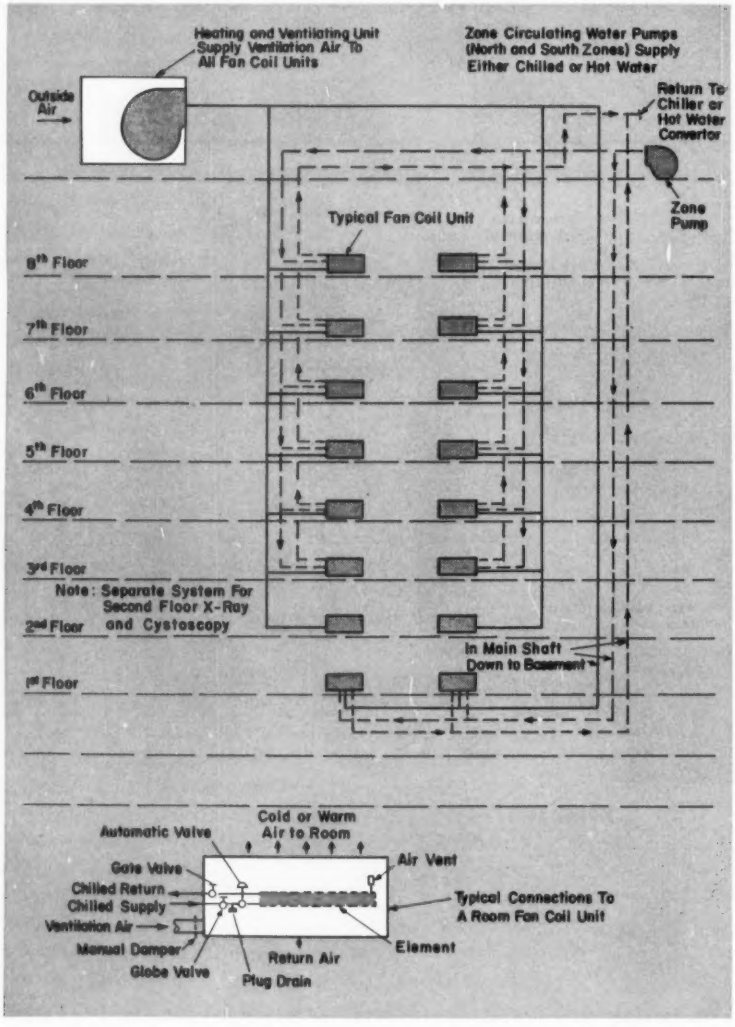
Vincent A. Megna, of Daniel, Mann, Johnson & Mendenhall, architects & engineers, reports that the Presbyterian Inter-Community Hospital in Whittier, California, is completely air conditioned. Room induction units are used in the nursing wing, with primary air quantity and temperature sufficient to provide all the heating needed during the heating season. Chilled water is available in the piping system all year round to tone down any possibility of overheat, thereby providing room zoning capability. During the cooling season, the primary air supply is refrigerated only for transmission requirements. Outside air is conditioned in the primary unit and any further cooling is done by the room coils.


Chilled Water Expansion Tank
Induction Unit With Steam Grid Humidifier
Induction Unit
Chilled Water Secondary Coils
3" Branch Run-Out
Automatic Pneumatic Valve
Primary Air Supply
Typical Unit Connections
Secondary Chilled Water Return
Secondary Chilled Water Supply
Header Conduit 9" ø Maximum
Steam Supply
Drain
Fusible Link Fire Shutters
North Zone Riser
Secondary Chilled Water Return
Secondary Chilled Water Supply
Secondary Chilled Water Supply at 55°F
Three Way Mixing Valve
Chilled Water Pumps
Secondary Chilled Water Pump
Water Chillers
Chilled Water Supply
Hot Water Coil
Submaster Thermostat To Reset Heating Supply Air Temperature
South Zone Riser
Future Electrostatic And Carbon Filters
Chilled Water Primary Coil
Hot Water Coil
100% Fresh Air Intake
Sound Trap
Primary Air Fan
Primary Air Unit



Radiant heating and cooling system will be installed in new Gottlieb Memorial Hospital. A. Epstein and Sons, Inc. are the architects and engineers who have designed the system. Sun shades will cut cooling load.





Slocum & Fuller, consulting mechanical and electrical engineers, designed this fan-coil system to air condition a new section of the Methodist Hospital of Brooklyn. Architects were Rogers & Butler, with Fred N. Severud, consulting structural engineer. Central refrigeration plant is located on the ninth floor and uses steam absorption refrigeration to chill water.

tenuating room or zone unit. This all-air system is a true high velocity, high pressure system and can use very small ducts with proper noise control.

Newest addition to the hospital air conditioning field is the radiant ceiling panel for year round operation. Ralph J. Epstein, of A. Epstein and Sons, Inc., Chicago engineering firm, reports, "We are specifying a metal pan radiant heating and cooling ceiling for the Gottlieb Memorial Hospital in Melrose Park, Illinois. We feel that this system has been thoroughly proven in large office buildings (see CONSULTING ENGINEER, "Engineering Alcoa's Building," September 1953) and that it will provide a high degree of comfort and efficiency in this new 120-bed hospital. Coils over the metal ceiling pans will circulate chilled water in summer and warm water in winter. With temperature of the water always above the dew point, condensation will not be a problem, and the patient's room will not be cluttered with any of the usual heating or air conditioning units. Rooms will have individual control, and tempered air will be circulated through ducts from a central system. Ceiling construction is extremely light and simple, and an acoustical blanket will give good soundproofing quality. Since the human body releases about 60 percent of its generated heat through radiation, we feel a radiant system offers the maximum in patient comfort."

The problem of air conditioning is strongly affected by building design as well as climate and atmospheric conditions. Milo Ketchum, of Ketchum and Konkel, points out that sun load is a major factor in Denver. Screens or louvers should be used to keep sun off the windows. Good sun screens can cut the cooling load in half. Thus, air conditioning also is a structural engineering problem.



San Bernardino County Hospital has modern kitchen designed by Fred Schmid Associates of Los Angeles.

Food Handling is Improving

Food handling and processing have both undergone rapid change. The use of conveyor systems for assembly of food on trays, and even for delivery to



Continuous belt type dishwashing machine insures minimum manual handling. Jay Dewey Harnish, architect.



Conveyor belt food assembly line, with food kept at constant temperature in dispensing receptacles at left.



Range design eliminates most areas where spilled food can accumulate. Open areas are easily kept clean.

the nursing floor, is not uncommon in larger hospitals. However, the most important change is in mobility. Food handling and processing equipment is now largely caster mounted, eliminating much of the handling and making the kitchen and adjacent service areas easier to clean because equipment can be easily moved out of the way.

There are now a number of food handling specialists who work closely with the architect and the electrical and mechanical engineer. Fred Schmid Associates of Los Angeles and Chicago have been very active in designing hospital kitchen facilities. It is their feeling that American manufacturers hvae only begun to give attention to sanitation problems created by equipment design. The modern hospital range, for example, no longer rests directly on the floor with a row of shelves behind it. Rather, it rests on a raised platform with a clear surface for unobstructed drainage of spilled food. Dishwashers, too, are better designed, with only a minimum of manual handling required.

Hospital Plumbing Requirements

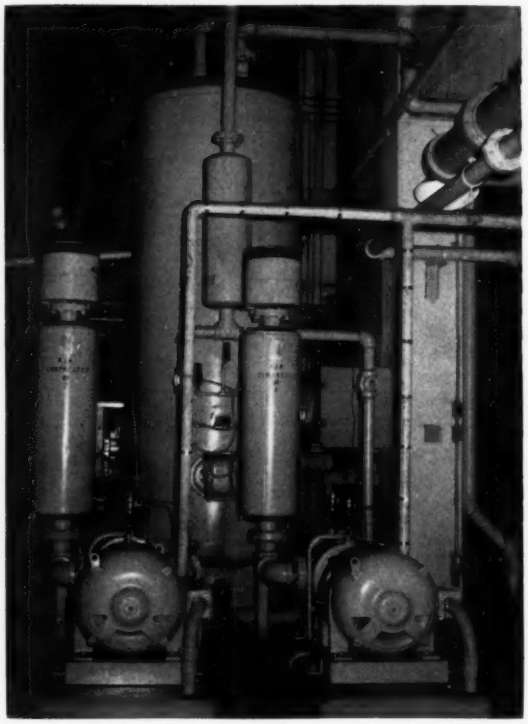
Hospital plumbing has been influenced by the increasing emphasis on sanitary procedure. The use of gooseneck fittings on lavatories, and vacuum breakers to prevent backup of contaminated water in bathtubs, janitor's sinks, and other fixtures is considered absolutely necessary. All hospital water supply must be fit for human consumption, regardless of whether it is so to be used or not.

Hospitals place a heavy load on sewer and water systems. Since it is always desirable to utilize public services, hospitals should locate where these services are adequate. However, booster systems for water lines are almost always required for buildings over two stories, and where deep basements are required sewage outflow must be maintained.

Room plumbing fixtures for patients are almost always of a type that do not require hand contact on control levers and valves. And the bathtub is giving way to the shower, partially because the shower is less expensive and more easily maintained, but mainly because the average patient can use a shower, properly equipped with hand rails, much easier than he can climb into and out of a tub.

Special Services Becoming Standard

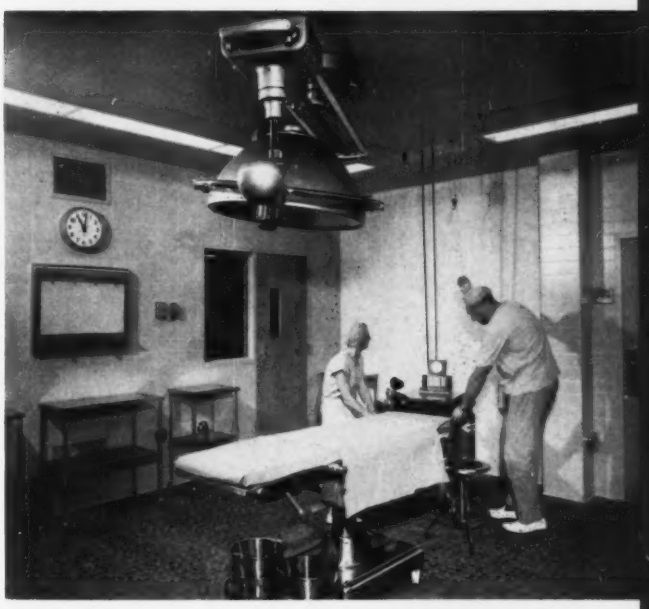
Special services now commonly accepted in the hospital design include central piping of oxygen and vacuum lines to patient rooms as well as to surgical and obstetrical suites. Just this year, one Chicago hospital installed a liquid oxygen tank in the yard. A converter changes the liquid to gas at desired pressure for piping throughout the hospital.

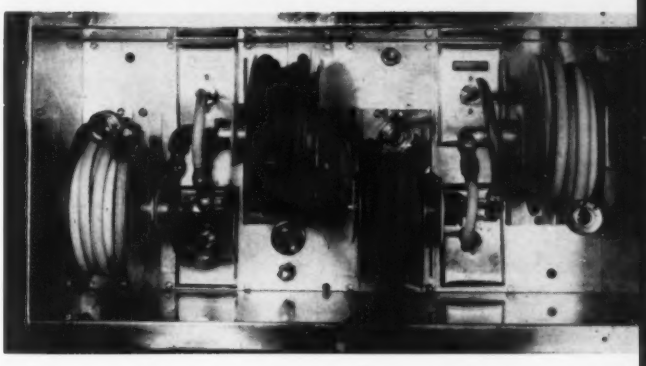


U. S. Veterans Research Hospital in Chicago uses 400-gpm pneumatic ejectors on sewage line. Shown here are the compressors and the air storage tank for the system.

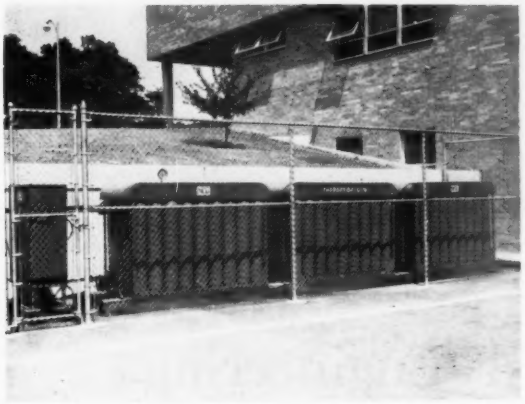
In the operating room there are still some gases which cannot be piped in because of their explosive nature and the limited amounts used. However, ceiling mounted hose reels for operating rooms are now available for oxygen, vacuum, air, carbon dioxide, and nitrous oxide. Color coded hose and non-interchangeable quick couplers prevent misuse.

Many other special mechanical features in the hospital are, or soon will be, in use. The pneumatic tube for messages and medicine delivery is not uncommon. The fully automatic elevator has improved traffic flow for visitors, patients, and staff, and laundry equipment is being consolidated so that one machine performs several operations. All of these help to cut labor costs. However, even greater savings must be made if the public is to continue receiving adequate hospital care. The engineer should find this a challenging problem.





Ceiling mounted hose reel in operating room of Columbia Hospital, Pittsburgh, keeps lines off of the floor.



Bank-fill oxygen installation at Marion General Hospital, Marion, Ohio serves as central source of supply.



Manifold unit controls flow of oxygen from cylinders in central location to outlets placed throughout hospital.



Liquid oxygen converter in yard is newest system of central supply for use throughout hospital.



California's Greater Bakersfield Hospital makes use of latest design concepts and modern electrical and electronic equipment. Washington & Mitchell, structural consultants and Buonaccorsi & Murray, mechanical and electrical. Architect for the reinforced concrete structure was Stone, Marraccini & Patterson, of San Francisco.

Hospital Electrical Engineering

(Including Communications and Controls)

ALTHOUGH SOME HOSPITALS have been equipped with high voltage lighting systems, there is no observable trend in that direction. About 80 percent of all hospital lighting is incandescent, so there seems to be little advantage in going to higher voltages or frequencies. Much attention has been given to operating room lighting, but this is a highly specialized design field left largely to the manufacturers. The consultant need only provide the outlets.

Power supply to the hospital should come preferably from two separate sources provided by the utility system. The hospital also may want duplicate secondary services to take care of electrical failures within the building. In addition, standby power is required, usually in the form of a gasoline, diesel, or gas engine driven generator. A further safeguard for the operating room lighting system may be provided by storage batteries.

Diesel and gasoline generator sets cost about the same in the 75-kw range. Diesels are less expensive in the larger units while gasoline engines are cheaper in the small sizes. One of the advantages of the gas engine is its ability to run on either bottle gas (LPG) or gasoline.

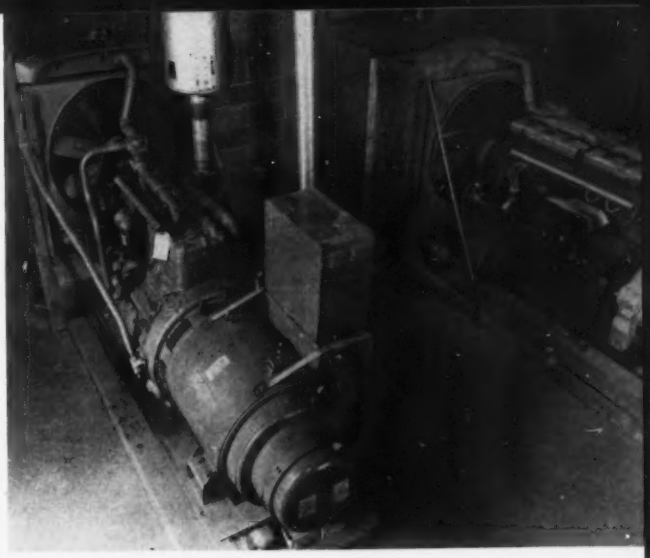
Engineers are finding a need for more and more standby power capacity. Some attribute this to the fact that long and frequent stoppages of utility power service are not uncommon in many areas. However, higher requirements generally are caused by the demand that more services, such as elevators, be maintained during a power service interruption.

Many hospitals are receiving 480-v 3-phase current, using it directly for power loads and transforming it for lighting loads. Frequently separate transformers are used with such equipment as X-ray machines. In addition, all circuits to operating

or delivery rooms have the neutral ungrounded as a safety precaution against possible sparking.

Elaborate control systems are the rule in new hospitals. These may range from the indicator in the operating room which warns of the development of dangerous grounding conditions to the simple red light at the nurse's station to tell her when someone is tampering with the narcotics locker. Hospitals with specialized surgical departments may have to provide more space for instruments and controls than they do for actual operating area.

Much instrumentation (electronic or pneumatic) is designed to keep maintenance personnel out of the hospital rooms and corridors. Modern air conditioning controls now are located at a central point, complete with indicators for temperature and humidity for all the zones served by the system. Thus, there is no need for frequent room checks.



Two 125-kw, gasoline engine driven emergency power generators serve the Spartanburg General Hospital.

Communication Systems Grow Complicated

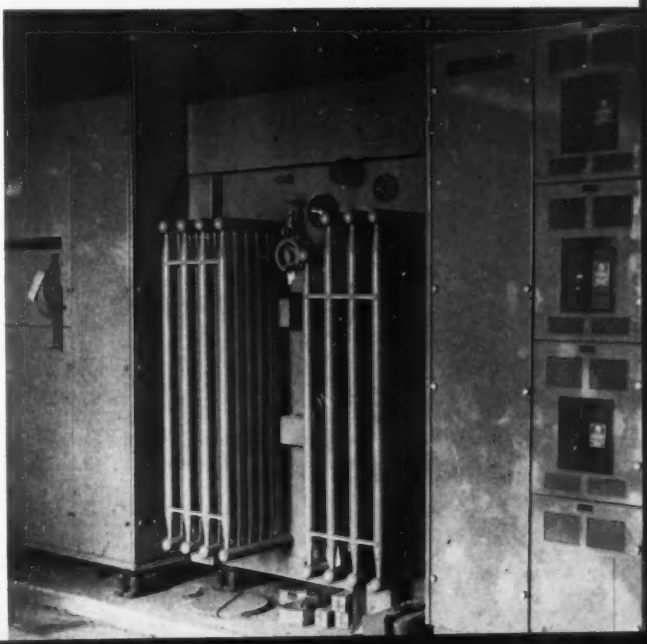
Communications are of vital concern in view of the nurse shortages and the high levels of occupancy. A decade ago a 100-bed hospital normally would have about 70 bed patients. The figure now is running above 90 in most general hospitals. To permit the rapid assigning of rooms to incoming patients a system is just now available which gives complete information to the business office. Nurses on the floor have a push-button system in each room which ties in with a central control board in the business office. This board shows occupancy and housekeeping conditions.



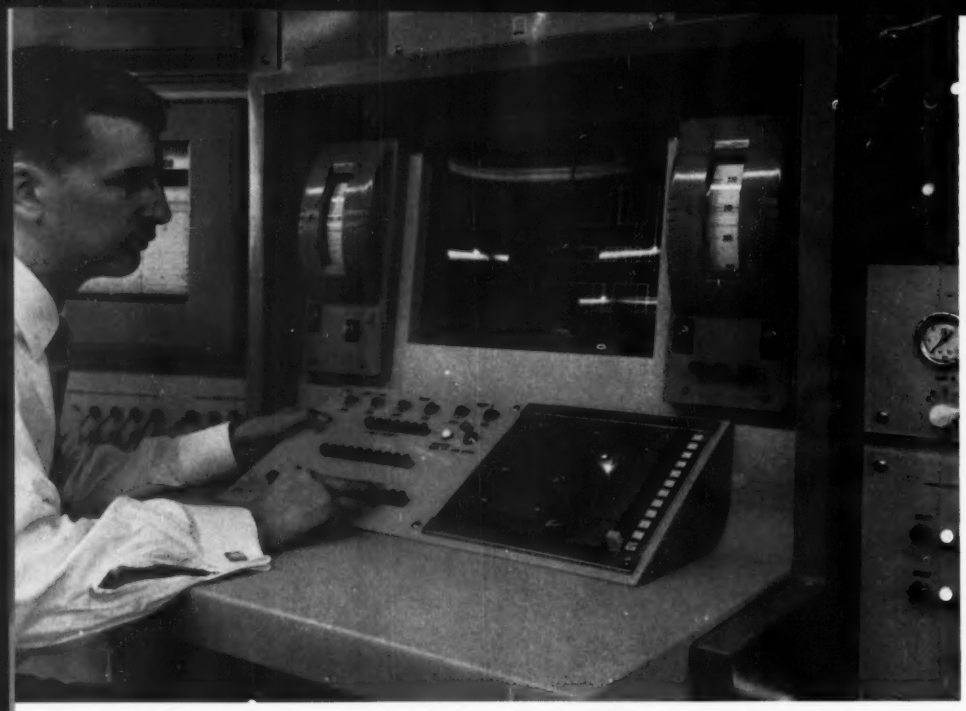
High voltage distribution switchgear and one 208/120-v wye secondary transformer used by Lockwood Greene.

Since good patient records are important both medically and administratively, hospitals are trying to improve them. J. W. Scharres, of the E. R. Gritschke firm reports, "One method we have found effective is to install central stenographic systems with dictating booths scattered about the hospital. The busy (or lazy) surgeon now can step out of the operating room and dictate a complete report on the operation, give instructions for post-operative care, and prescribe medication. Use of the Tel-Autograph system also is becoming more general because it provides a written record, often at several stations simultaneously, in the sender's own handwriting. It is excellent for writing prescriptions, for it permits the doctor to retain his professional privilege of illegibility."

The traditional audio paging system has been under heavy fire in many hospitals. Its detractors claim that the unnecessary noise is disturbing to patients, and that visual signals in corridors and at nurses' station, or short wave signal systems directed to small pocket receivers, are better. Unfor-



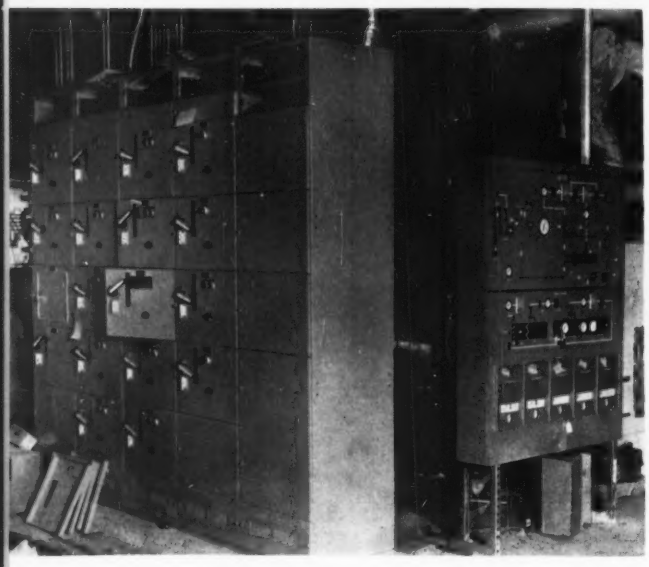
Substation is 750-kva unit with 480-v, 3-phase secondary located in penthouse of new hospital addition.



Building engineer sits down to monitor and adjust temperature in any area of the building at St. Mary's Hospital in Minneapolis. Slides show system diagram, floor plan, or other data. When push-button switches a particular slide on the screen, operating controls on the console are simultaneously switched to the system represented by the slide. Additional buttons allow reading and adjustment of temperature in a specific area without affecting others.

tunately, it has been found that many a busy doctor has failed to tune in (or quickly tunes out) his personal receiver. In this respect, visual signals are better, for the signal can be seen not only by the persons being paged but by all the staff in the building. Everyone knows who is wanted. The trend is to provide at least two paging systems, one being a general audio system to be used when the silent system fails to make contact. It is like calling a small child. First you call gently, and when that doesn't work, you have to yell.

Patient contact with the nursing station also has grown more complicated. It now incorporates a flashing light outside the room as well as at one or more other locations, a buzzer in the nurse's station, and two-way telephone contact. The telephone contact can be used for monitoring critical patients on an audio basis, at the discretion of the doctor or



Motor control center and air conditioning panel are located together in penthouse of Spartanburg Hospital.



Wall mounted speaker, narcotics locker warning light, nurses call lights, and oxygen valves are all in sight.

nurse. However, a cut-out, controlled by the patient, must be provided under these circumstances to assure privacy when the patient desires it. This is interesting from an engineering point of view, but a method of actually getting the nurse to come when the patient signals has yet to be discovered.

Telephones, TV, and radio have become almost universally available to the hospital patient. Some hospitals have simply equipped each room with a fixed number of channels for built-in TV and radio and provided each bed with pillow phones or earphones. This system is objectionable in that it requires servicemen to enter the rooms for repairs, and it forces every patient to pay for the service whether it is wanted or not. Presumably, there are still some Americans not addicted to TV.

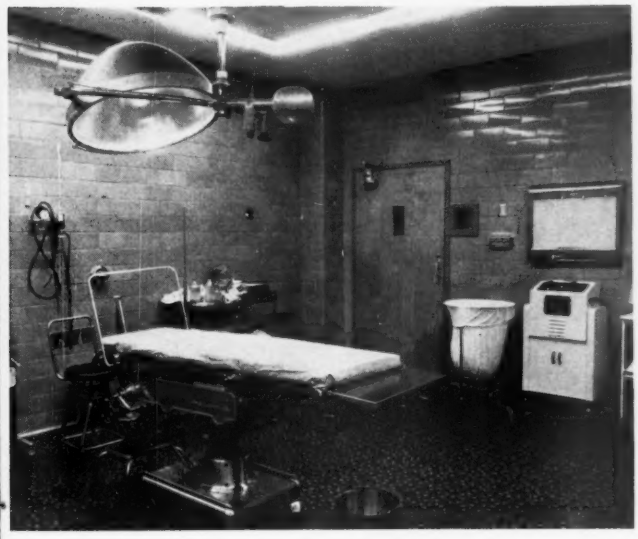
Many consulting engineers prefer to pipe antenna connections into the room with the patient providing his own set or renting one. The set is removed from the room for repairs, and the hospital can contract for maintenance and rental from an outside firm. Noise control could be a problem, but most sets can be equipped with pillow phones.

Closed Circuit Television

Hospitals now are making considerable use of closed circuit television. At Walter Reed there is a new color system that broadcasts from the operating room to instruction rooms. Inside John Doe is presented to the class in the magic of living (we can hope) color. The very latest idea for closed circuit TV is a camera in the visitor's room and a receiver by the patient's bed with two-way sound. Conta-



Bedside control center does almost everything but cook meals. This one tells time, pulls drapes, controls temperature, adjusts bed, calls nurse, and dims the lights.



Typical operating room has conductive floor, thermostat, oxygen and vacuum fittings, explosion-proof switches, and ground detector with an alarm device on the wall.



Typical hospital private room facilities include bed light, electrical outlets, audio-visual nurses call, oxygen supply, and sanitary plumbing with bedpan washer.

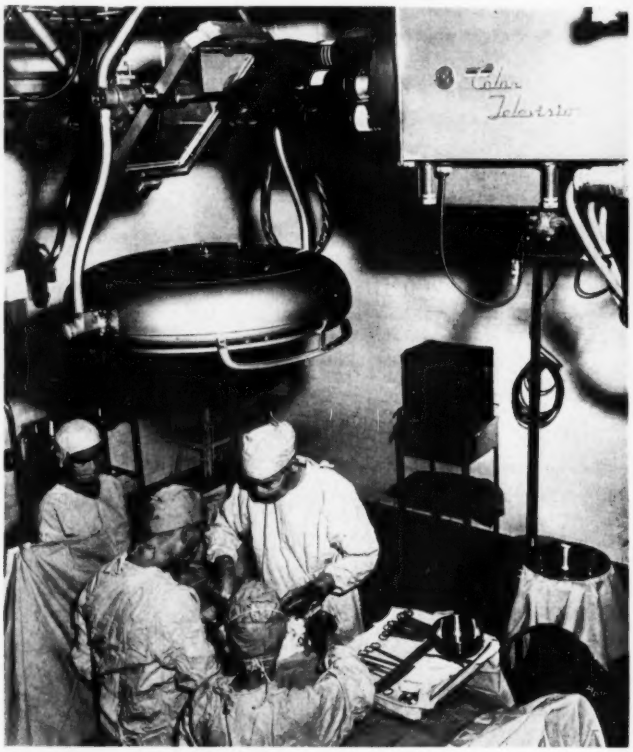
gious cases can visit with the family this way. A camera also can be put in the nursery so father and brothers and sisters can see the new baby close up without giving him measles. The possibilities are unlimited, if sometimes a little ridiculous.

Even the hospital fire alarm has been thoroughly refined. Most systems now provide for silent signals or localized audio signals, with a manually operated general alarm for use only in extreme emergency.

All of this electronic and electrical equipment makes the modern hospital a maze of crisscrossing wires. The electrical engineer needs to be consulted early in the structural planning if an economical system is to be developed for installing and maintaining wiring. Whatever the solution, it is important that the electrical and structural engineer and the architect work together before the structural system is finally selected. ▲▲



TelAutograph system at Kansas City Research Hospital delivers written message to central drug dispensary.





Color camera in operating suite is remotely controlled so that surgeons can proceed without interference. Lower photo shows technician operating camera, with monitor screen in background. Other hospital uses for closed circuit TV involve remote viewing by patients in contagious wards or of babies in nurseries.



German Consultants— Engineers of a New Germany

DR. THOMAS P. HUGHES
Washington & Lee University

CE exclusive

AMERICAN ENGINEERS have long expressed respect for German engineering. In the late 19th and early 20th centuries graduates of our universities and engineering schools frequently traveled to Germany for several years of study to round out their education. A surprisingly large number of our great engineers have been either Europeans who emigrated after an European education or Americans who managed to absorb European learning.

One still finds the eternal American in Paris (or at the Technische Universitaet in Berlin) eager to absorb the fruits of European culture, but one also finds a healthy respect from the European, and in particular the German, for American engineering. The observer on the German scene also will note the ready praise the American student who has spent a year or so studying in Germany has for American engineering education; the same student who only a year before had found so much to criticize in his American engineering school. A correlation of opinion indicates that the German engineer could learn much from American, and there is much for the American to absorb from Europe.

German Differences

What exactly can the American consulting engineer learn from Europe or, specifically, from Germany? Two characteristics of German consulting engineering that are unique with respect to America are tradition and the cheap labor, along with relatively costly materials. Although America acquires traditions with time, and labor costs in Europe are rising (there appears to be a leveling off in the

NATO area to day) the differences remain great enough to be significant.

Concerning the cheap labor-costly materials factor in Europe, the observer of the European scene will find consulting engineers doing many pages of calculations for quite small structures in order to whittle away materials cost. Consulting engineering firms will do 100 pages of calculations for a small commercial building in comparison to America where a small structure frequently is built without detailed structural calculations. In all probability the American engineer will turn to already-prepared and generally applicable tables to select components for a specific structure more frequently than will his German counterpart. It is interesting to note, therefore, when the engineer in Europe speaks of cheaper labor he not only has the labor of the building trades in mind but also that of the technician and engineer. (After five years of practice the graduate engineer probably will not have an income comparable to that of his American counterpart, yet living costs in Germany are not low).

This situation with regard to labor-materials cost means that German consultants are doing some pioneer work. European bridges have long been noted for their thrifty and often daring design, and at least one consulting engineering firm in Germany has its own photoelasticity laboratory where the latest scientific theory can be applied to structural design. The fact that the German consultants have lower labor costs raises some interesting questions about competition between American and German consultants in underdeveloped regions. Such questions incidentally will fall within the fields of interest of FIDIC (International Federation of Consulting Engineers) to which both the German VBI (the Association of Consulting Engineers) and the American Consulting Engineers Council belong.

Tradition

The labor-materials cost factor in Germany is much easier for the American consultant to appreciate than the force of tradition. Tradition, whether it is in the field of politics or consulting engineering, might be defined as the influence of historic institutions, techniques, and beliefs on the present-day situation. Any American who has traveled in Europe knows the weight of tradition in this history-rich area; sometimes he finds these traditions troublesome but at other times salutary (many American travelers complain of European plumbing but few complain of the traditional excellence of service in European hotels).

Two components of German tradition influencing the practice of consulting engineering in Germany today are an inclination toward, and a genius for, organization; and an appreciation of professionalism (perhaps "professional dignity and responsibility" defines German "professionalism"). During the 19th century Americans became familiar with the German's appreciation of professional dignity and responsibility. German officialdom and the free professions, while at times somewhat too aloof for the American, seldom failed to win his respect for their competence. Despite claims of younger-generation Germans to the contrary, the professional title in Germany yet carries considerable prestige even in a self-consciously democratic nation.

As for the genius for organization, it too revealed itself in the 19th century. No student of economic history can fail to be impressed by the power and effectiveness of the various forms of organization, corporations, trusts, and cartels that proliferated on the late 19th-century German scene. It is important to remember that the German government, unlike the U.S. government, did not consider the German cartels and similar organizations as unhealthy economic growths but rather as factors contributing to the general welfare of the nation. While the 20th is not the 19th century, and the association of consulting engineers is not a giant steel-coal cartel, tne contemporary observer of the German scene will find that the German genius for organization again reveals itself.

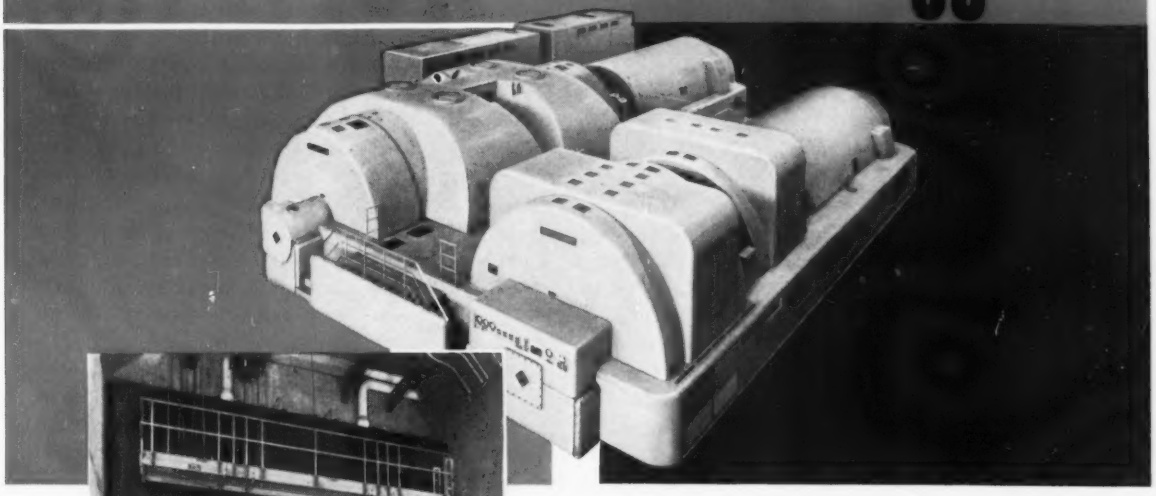
VBI Promotes Professionalism

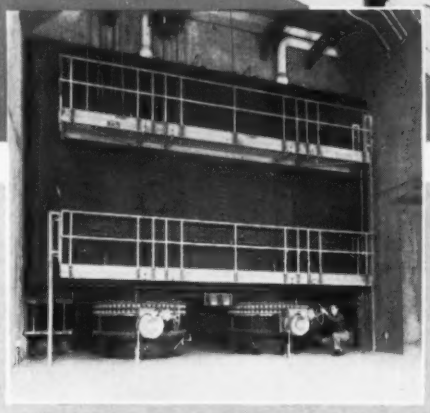
Professionalism among the German consultants today is manifest in the constitution, procedures, and problems of the *Verein Beratender Ingenieure* which is the oldest and largest of the German organizations for consulting engineers. VBI has about 800 members out of the 3000 or so consultants in Germany. Formed in 1903 by a group of consultants in the electrical field, VBI considers itself the spokesman for the outstanding independent consultants in Germany. The organization maintains the high standards and dignity of the profession by requiring a Technische Hochschule (engineering school-university level) degree or the equivalent, and more than six years of professional experience along with at least one year in a consulting office as a prerequisite for membership.

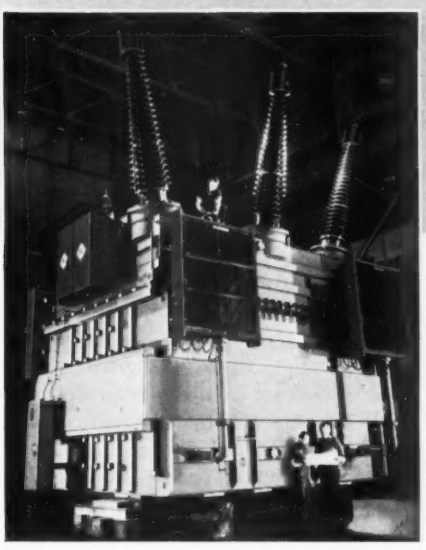
A convincing example of the German sense of professionalism is VBI's insistence upon simon-pure independence on the part of its members. The constitution of the association demands both self-employment and independence (*unabhangigkeit*) of its members. According to a spokesman for the VBI, prospective members are scrutinized closely before being accepted as self-employed and independent.

Apparently the criterion for self-employment offers little problem, but that of independence is a headache. It probably will surprise members of American professional societies to learn that VBI

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examines the status of its prospective members so thoroughly that the charter of an incorporated firm of consultants will be examined against VBI standards to determine whether the head of the firm is independent or whether his freedom of action to act as a trustee of his client is limited.

Another example of the professionalism fostered by VBI is the association's code of ethics — a code of ethics that is enforced by the threat of expulsion (an examination of the records of VBI will show that expulsion is not an empty threat — the periodical of the association will from time to time list former members with the *ausschluss* tag behind the name). A court of honor handles cases involving serious breaches of professional ethics.

The core of the code of ethics is the categorical insistence upon the independence of the member. According to the code the consultant must not accept any money or reward in the course of rendering his services other than the stipulated fee from his client, and he must not be financially involved with manufacturers, products, or contractors in any way that might prejudice his opinions.

VBI also tries to guarantee that its members charge at least the minimum rates shown in its fee schedule (GOI). The latest edition of this 52-page booklet appeared in 1956. It is not solely a product of VBI but of a committee on which VBI members have the determining voice. Not only do VBI members use the schedule, but the other consultants in Germany find it a convenient reference.

Services to Members

After reading of the professional standards required of its members by VBI, one should not conclude that the association only makes demands and does not offer services. The association, because of the standards it maintains, gives the consultant the dignity and responsibility that many of them seek. In addition, it is at this very time working hard to win acceptance from the German government of the fee schedule. The government has found it convenient to use a fee schedule published in the 1930's. In addition to this work, VBI does legal work of a professional character for its individual members and is able to offer the many years of legal experience of association managing director, Dr. Machemehl, in this field.

In addition to this legal and legislative work, VBI will organize the type of professional meeting familiar to the American engineer and also will go to bat for its members when they are troubled by "unfair" competition. As in America, the German consultant, especially the lone wolf or smaller firm, is bothered by "kitchen sink" engineers or "*schwarzarbeit*." With its knowledge of the ins and outs of the profession, the staff of VBI is able to unloose a variety of tactics to discourage this type of competition. "Free engineering" also is frowned upon by German consultants, but it exists.

The association also maintains a roster of members and lists their fields of activity, making it possible for the association to suggest engineers when bewildered clients ask for assistance. Not only does it make recommendations in answer to specific requests, but it also attempts to publicize the profession to those who need to know about it (but when the association publicizes it must take great care not to offend a host of its members by bringing into question professional dignity through overly-enthusiastic publicity efforts).

The association also represents the consultants in the approximately 300,000-member *Bundesverband der Freien Berufe*. The *Bundesverband* promotes the common interests of the professional people in Germany including M.D.s, architects, writers, and consulting engineers along with a large number of the other free professions. Needless to say, the voice of the *Bundesverband* is heard in the legislature.

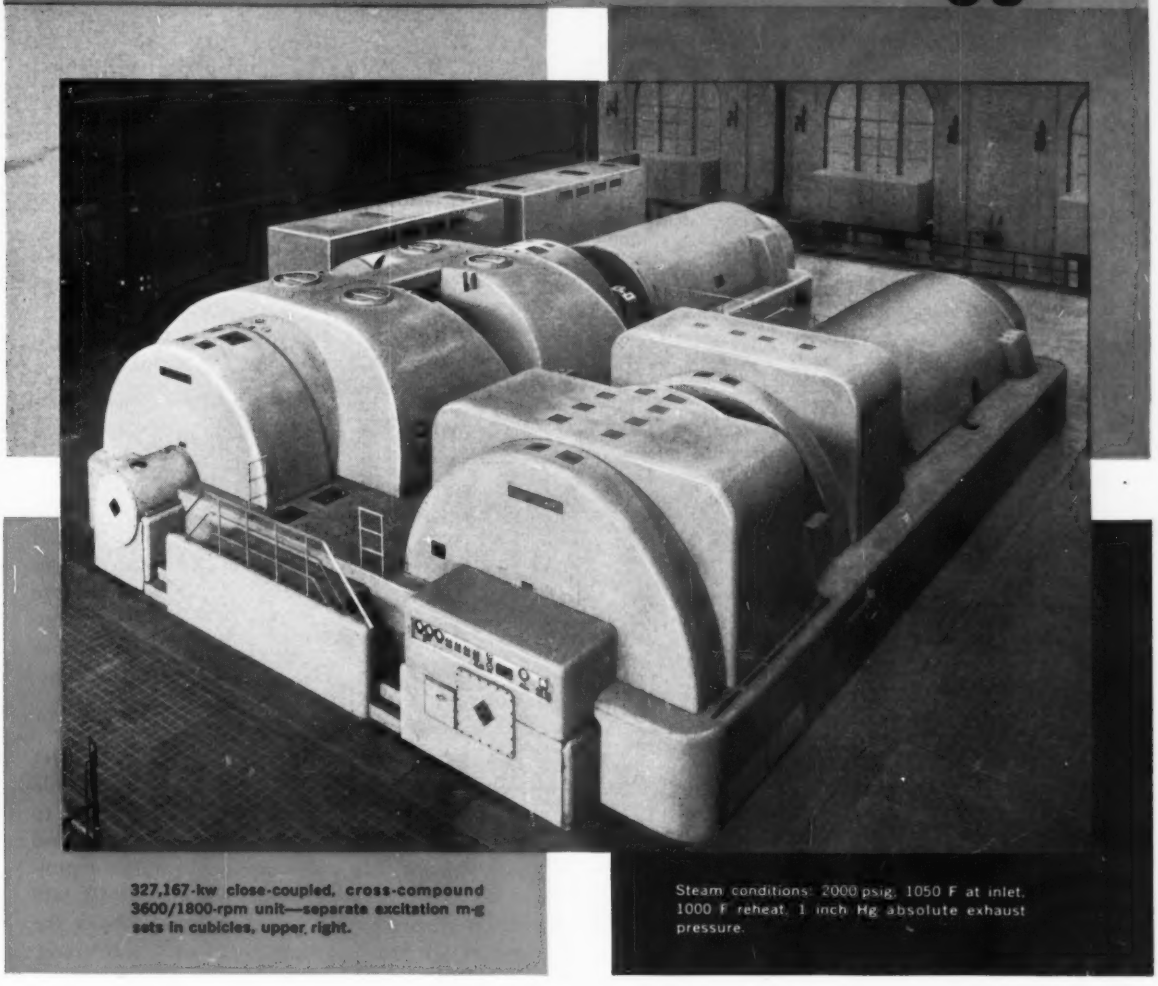
Association for Firms

Another professional organization that plays a major role in the activities of German consulting engineers is the *Gemeinschaft unabhangiger beratender Ingenieurbueros* (or *Gemeinschaft*). *Gemeinschaft*, unlike VBI, does not have individual engineers but instead has consulting firms as members. About 30 percent of the individuals heading these *Gemeinschaft* member firms are also members of VBI. With about 30 member firms, *Gemeinschaft* has its administrative center at Bonn, close to the politico-economic heart of West Germany. So located, the staff is in an excellent position to work on the very complicated tax problems with which consulting engineering firms in Germany have to deal. Like VBI, *Gemeinschaft* also is working for government recognition of a standard fee schedule.

In addition to representing the interest of the German consulting firm in the legislative halls and the executive bureaus of the government, *Gemeinschaft* publicizes the role that the independent consulting firm does and can play in the economy. A well-gotten-up brochure and a short leaflet, distributed by the organization, describe the ways in which consulting firms serve their clients. The brochure also includes pictures of some of the outstanding projects of *Gemeinschaft* member firms, and a brief description of each member firm, including the definition of the firm's work area and the names of leading personnel.

Gemeinschaft stresses the capability of the independent consulting engineering firm to supplement the regular engineering staffs of industrial enterprises and of government bureaus; in other

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327,167-kw close-coupled, cross-compound 3600/1800-rpm unit—separate excitation m-g sets in cubicles, upper right.

Steam conditions: 2000 psig, 1050 F at inlet, 1000 F reheat, 1 inch Hg absolute exhaust pressure.

Commonwealth Edison's new 327,167-kw Fisk 19 doubles station output

This steam turbine generator, the second of several such Allis-Chalmers units to go into service, is equipped with record 46-inch long exhaust blades. The unit's 200,000-sq-ft Allis-Chalmers condenser, too, is of world-record size.

Notable among today's generation achievements, Fisk 19 employs close-coupling with short crossunders, a ring-type nozzle chest, side-mounted turning gears, a double-flow intermediate pressure turbine and a fully supercharged 3600-rpm generator.

Consulting Engineers: **Bechtel Associates**

To learn more about these and other design features of Allis-Chalmers tandem and cross-compound units, see your nearby A-C office or write to Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

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words, to take over the peak load or the nonroutine project. It also argues that the consulting firm will bring a fresh and creative approach to bear on problems which regular engineering staffs might tend to approach in a routine fashion. Because the consulting bureau can relieve government and private enterprise of maintaining staffs of engineers large enough for peak loads, but oversized for routine demand, *Gemeinschaft* argues that the use of consulting bureaus will aid in solving the shortage of engineers, a problem which troubles Germany as well as the U.S.

Foreign Projects

A major area of interest, business-wise, for *Gemeinschaft* is foreign work. From conversations with VBI and *Gemeinschaft* members it seems that the focus of attention at this time for German consultants is the Near East. Insomuch as Germans won a healthy respect from business competition decades ago when they invaded British markets in the Victorian heyday of British power, German overseas activity is not to be discounted lightly.

Both VBI and *Gemeinschaft* are aware of the importance of activity by German consultants overseas for the general welfare of the German economy. Now that it is customary for the World Bank, the International Finance Corporation, and other major financing activities to require the advice of an independent consultant on a major project before actual construction begins – and the advice of a consultant who is not prejudiced by specific ties with contractors or manufacturers that might be later brought into the project – the role of the consultant assumes considerable importance. As is noted in a publicity release of *Gemeinschaft,* consulting engineers despite their objectivity naturally tend toward measurement systems, norms, and types of equipment which they know from their own national experience, and thus the nation which does not have its consultants on hand is at a disadvantage.

Another function of *Gemeinschaft* is the promotion of joint projects for its members, abroad and in Germany. With a membership that has worked on projects during the past five years with a value of over $3000 million, the organization can tap a rich supply of talent in all fields of consulting engineering. With a centralized administrative head these firms are prepared to work in close coordination and to give the client the benefit of different points of view along with unity of purpose.

Joint Venture Group

Members of VBI also engage in joint ventures. The DSBI (*Deutsche Societaet Beratender Ingenieure,* GMBH) is such a business organization. The consulting engineering firms in Germany do not have among their ranks giants comparable to some of the U.S. firms (a consulting bureau in Germany with 50-100 employees is regarded as a huge one). To offset the disadvantages and to capitalize on the advantages of small size, nine consulting engineering firms of VBI have set up DSBI as a joint enterprise. Each of the participating firms owns stock in DSBI and together they enjoy complete ownership and control.

DSBI is not a holding company for the member firms, but by contrast is a subsidiary organization which institutionalizes the owners' capacity for joint projects. Each firm retains its individuality except when there is a decision for a joint project; then the firms participating function as a part of DSBI to the extent of their contribution and for the time span of the project.

DSBI has an administrative head and an office, but does not have a staff of engineers or technicians. It claims the advantage of having the talents of nine good-sized firms at its disposal and therefore the advantage of size. At the same time, it claims to be free from the disadvantage of size in that it can call upon the top men of nine independent firms rather than upon the employees of a large firm with a single head (this assumes that the top engineers prefer to head their own organizations rather than accept employment in a large organization).

DSBI Still Young

Since DSBI is only two years old, it is not yet possible to evaluate the contribution it has made to its member firms. The present head intends to accelerate the activities of his organization and hopes that not only will members bring joint projects to DSBI to administer, but that DSBI will bring in clients for the member firms. Among the members are firms specializing in air conditioning, heating, and ventilation; building; roads; electrical work; field survey; water supply; and management.

In one large German firm of consulting engineers, the head is board member of VBI, a part owner and enthusiastic supporter of DSBI, and his firm is a leading member of the *Gemeinschaft.* It would not appear, however, that this makes him a splintered personality but, by contrast, he rests comfortably knowing that his professional interests, dignity, and responsibility are maintained; that his capacity for foreign work and giant cooperative projects is furthered; and that his tax and legal problems are in capable hands. He can specialize and at the same time be able to offer well-rounded general engineering services.

A traditional inclination toward professionalism and organization may well prove, for the German consulting engineer, an asset rather than a handicap in a dynamic 20th-century economy. ▲▲

ALLIS-CHALMERS modern line for '59

Today's biggest condenser



200,000-square-foot condenser now in operation at Fisk Station of Commonwealth Edison

Consulting Engineers:
Bechtel Associates

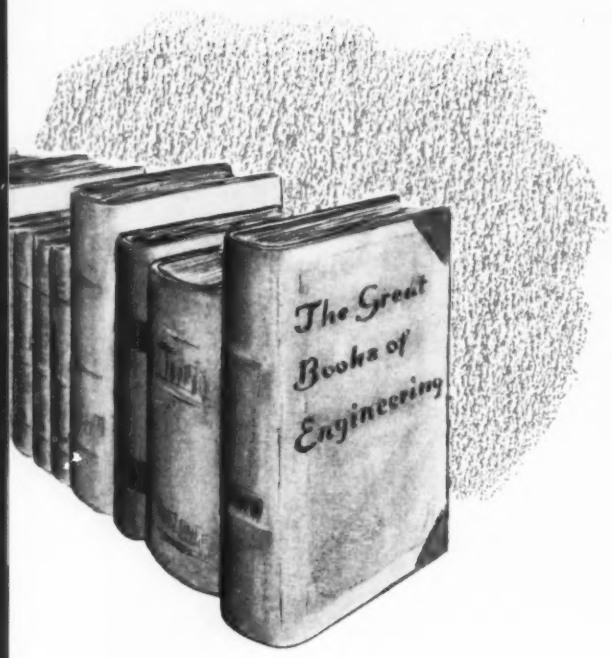
Some man-sized problems were presented by this unit . . . not the least of which were shipping and erection. Special Allis-Chalmers well-center cars permitted shipment of the entire shell in only four sections. Special alignment techniques developed by A-C cut installation time.

Today it serves a 327-mw Allis-Chalmers steam turbine generator. Note the compact, space saving rectangular shape pioneered by Allis-Chalmers and made practical by the A-C guided-flow condenser design.

For help on your condenser problems, large or small, contact your nearby A-C office or Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-1046-CE

ALLIS-CHALMERS



Vitruvius' De architectura

JAMES KIP FINCH, Dean Emeritus
Renwick Professor of Civil Engineering
Columbia University

DURING THE EARLY 16th century the first known manuscripts of two famous Roman engineering books came to light. Their discoverer, Poggio, was one of the most active and colorful personalities of the Italian Renaissance. A papal secretary, scholar, and collector of ancient coins, statuary, and manuscripts, Poggio combined these interests with a complete lack of moral and ethical standards characteristic of his age. Yet it was this man who found and preserved for us both the treatise on the work of the Roman *architectus* by Vitruvius and the later masterpiece of Frontinus on the water supply of Rome – two most remarkable and revealing engineering classics.

Poggio's credentials as papal secretary gave him access to those manuscript treasures which had found their way into the libraries of the monastic orders. It was in the monastery of St. Gall in Switzerland, about 1415, that he found the writings of Vitruvius. Seventy-odd years later, in 1486, it was one of the first engineering works to be made available through the new art of printing.

The modern engineer, reading one of the several excellent translations of *De architectura*, is apt to regard this ancient work as a curious and amusing composite of fact, fable, and fancy. Yet, if asked to name the book which has played a major role in the development of the engineering profession, the honor must go to this work of the obscure Roman builder who was active about the time that the Christian era was just getting established.

De architectura, in fact, became the architectural bible of the Renaissance. As such, it exercised an important influence on the rise of the artist-architect-engineer group which ultimately led to the divorce of these professions and to their separate and independent status. No less than three editions are numbered among the *Incunabula* – books printed before 1500 in the infancy of the new art of printing. Translated into some half a dozen tongues, it since has appeared in over 80 editions, a record for an engineering work and one which has few parallels in general literature.

Vitruvius' Writings

Marcus Vitruvius Pollio was apparently a relatively unknown and unimportant Roman *architectus*, or architect-engineer. No important construction can be attributed to him although he perhaps did plan one minor building. As a writer, he does not use the Latin of the classical authors, for, as he says, he writes "not as a very great philosopher, nor as an eloquent rhetorician, nor as a grammarian, but as a master builder who has had only a dip into these studies." Yet, he uses much space in prefacing each book of his treatise by retelling stories taken from earlier works, apparently to impress readers with his knowledge of the classical authors – a practice also followed by the later Ren-

An architectus must be a man of letters that he may keep a record of useful precedents. By his skill in draftsmanship he will find it easy . . . to represent the effect desired. Mathematics again furnishes many resources to the architectus. It teaches the use of rule and compass . . . By optics, in buildings, lighting is duly drawn from certain aspects of the sky. By arithmetic, the cost of building is summed up . . . The architectus ought to be familiar with history because in his works he often designs ornaments about which he ought to render an account to inquiries . . . Philosophy, however, makes the architectus high minded, so that he should not be arrogant but rather urbane, fair-minded, loyal, and what is more important, without avarice; . . . A man must know music that he may have acquired the acoustic and mathematical relations and be able to carry out rightly the adjustments of balistae, catapultae and scorpiones . . . Again he must know the art of medicine in its relation to the regions of the earth . . .

ON ENGINEERING EDUCATION

But, your Highness, I have not studied with the view of making money by my profession; rather have I held that a slight fortune with good repute is to be pursued more than abounding wealth accompanied by disgrace. Thus, little celebrity has come my way. . . . Other architectus beg and wrangle to obtain commissions; but I follow a rule laid down by my masters; not to seek employment but to be sought out; since an open countenance changes for shame when a request is made of a doubtful character. For the giver of a favor is courted, not the receiver. . . . Therefore our forefathers used to entrust commissions to architectus of approved descent in the first place; in the second place they inquired if they were well brought up . . .

ON ETHICS

aissance architect-engineer writers who relied so heavily on Vitruvius' masterpiece.

De architectura is divided into 10 books, or as we would call them today, chapters. They deal with not only the work of the construction expert, from materials to the planning of buildings and water supplies, but also with sundials, water clocks, hoisting equipment, and machines of war. Vitruvius also has much to say on the general condition of professional practice in the early Roman Empire and of what he regards as essential educational and ethical standards for the *architectus*.

When Augustus became the first emperor in 27 B.C. it was the advent of a new era brought on by returning soldiers, an influx of newcomers from the provinces, and a turning of Roman citizens from careers of public service to business or idle lives of luxury. Horace, whose verse has captivated many men from his day to ours, contrasted with regrets this new age and that of the sturdy Roman laboring in his fields — a man of sound qualities and honest toil. Vitruvius, a contemporary of Horace, echoed these regrets and complained that, in this new age, "the grand art" of the *architectus* was "boldly professed" by these newcomers, "the uneducated and unskillful." He insists that the members of "this great profession" must be specially equipped by nature and education to meet its many exacting practical and theoretical requirements, and even lists[1] precise disciplines (see excerpts).

. . . Again in writing the specifications, careful regard is to be paid to both the employer and to the contractor. For if the specification is carefully written, either party may be released from his obligation to the other, without raising of captious objections.

ON SPECIFICATIONS

Within living memory, when the base of the colossal statue of Apollo in the temple had been cracked across . . . a contract was let out for cutting a base from the same quarries. A certain Paconius undertook the contract . . . Paconius was so proud of his reputation that he did not convey it after the manner of Metagenes, but decided to construct a similar machine in another way . . . However, he could not keep the machine straight along the road, but it kept swerving to one side. Thus it was necessary to draw it back again. So Paconius by drawing it backwards and forwards frittered his money away and went bankrupt.

ON ENGINEERING ERRORS

Straub[2] argues that this list "tends to arouse a suspicion that this model architect is a product of Vitruvius' imagination rather than a reflection of Roman reality." Yet, as the old Roman notes, astronomy is the background for surveying, history for ornamentation in design, law for the writing of contracts, and medicine for the provision of water supplies and layout of cities. In fact, he even defends music in order that the engineer may be keen to detect the proper tuning of such instruments of war as catapults. In addition he insists on high standards of professional conduct for the *architectus*: "Let him not be grasping nor have his mind preoccupied with . . . receiving perquisites, but let him with dignity keep up his position by establishing a good reputation. No work can be rightly done without honesty and incorruptibility."

Technical Aspects of Book I

In Book I Vitruvius discusses the basic principles of architecture as applied to buildings – arrangement, proportion, symmetry, and economy – and goes on to discuss the orientation of a building as regards light, the avoidance of noxious winds, and the salubrity of sites. In this latter connection he insists that lowlands, subject to "the poisoned breaths of marsh animals," be avoided, suggests keeping away from the extreme heat of southern and western exposures because heat weakens even iron and "bodies in these places will be infected," and advises inspecting the livers of local animals as a sure indication of the quality of the air which will be available at a proposed building site.

In dealing with building materials in Book II, Vitruvius turns to "the principles of things" to explain how "materials are generated by nature and in what mixtures the assemblages of elements are blended." In accord with the natural philosophy of the day these elements are noted as water, fire, air, and earth. Brick and stone receive attention and especially sand, lime, and the volcanic earth, pozzolana. The latter, mixed with lime, produced the famous Roman hydraulic cement – so called since, unlike lime, it hardens in bulk or under water.

Standards for Design

Books III to VI are devoted almost entirely to architecture as we know it. Here one finds the design of the architectural elements such as columns, architraves, and entablatures reduced to rules which insure harmonious proportions. These were the books or chapters especially valued in Renaissance times, and the rules which later were developed by Vignola and others in standardized dimensions for the so-called classical orders – Doric, Ionic, and Corinthian.

Interior decoration and finishing are covered in Book VII, from both practical and aesthetic viewpoints. Both consultants and builders would find this section of interest, for the recommendations on construction reveal a good understanding of the advantages and limitations of many common struc-

Public statutes do not allow a thickness of more than a foot and a half to be used for party walls. But other walls also are put up of the same thickness lest the space be too much narrowed. Now brick walls of a foot and a half—not being two or three bricks thick—cannot sustain more than one story. Yet with this greatness of the city and the unlimited crowding of citizens, it is necessary to provide very numerous dwellings. Therefore since a level site could not receive such a multitude to dwell in the city, circumstances themselves have compelled the resort to raising the height of buildings. And so by means of stone pillars, walls of burnt brick, party walls of rubble, towers have been raised, and these being joined together by frequent board floors produce upper stories with fine views over the city to the utmost advantage.

ON BUILDING CODES

There is also a kind of powder which, by nature, produces wonderful results. It is found in the neighbourhood of Baiae and in the lands of municipalities round Mount Vesuvius. This being mixed with lime and rubble, not only furnishes strength to other buildings, but also, when piers are built in the sea, they set under water. Now this seems to happen for this reason: that under these mountainous regions there are both hot earth and many springs. And these would not be unless deep down they had huge blazing fires of sulphur, alum or pitch. Therefore the fire and vapour of flame within, flowing through the cracks makes the earth light . . . Therefore when three substances formed in like manner by the violence of fire come into one mixture . . .

ON ENGINEERING MATERIALS

. . . we must proceed as follows. Double cofferdams bound together with planks and chains are to be put in the place marked out. Between the supports, clay in hampers made of rushes is to be pressed down. When it is well pressed down . . . the place marked out by the enclosure is to be emptied with waterscrews and water-wheels with drums, and so dried. Here the foundations are to be dug. If the foundations are on the sea bottom, they are to be emptied and drained to a greater width than the wall to be built upon them, and then the work is to be filled in with concrete of stone, lime, and sand. But if the bottom is soft the foundations are to be charred piles of alder and olive filled with charcoal as prescribed . . .

Mill wheels are turned on the same principle, except that at one end of the axle a toothed drum is fixed. This is placed vertically on the edge and turns with the wheel. Adjoining this larger wheel there is a second toothed wheel placed horizontally, by which it is gripped. Thus the teeth of the drum which is on the axle, by driving the teeth of the horizontal drum, cause the grindstones to revolve . . .

In this book I have fully set forth the mechanical methods which I could furnish, and which I thought most useful in times of peace and war. Now in the previous nine books I have dealt with the other several topics and their subdivisions, so that the whole work, in the ten books, describes every department of architecture.

ON COFFERDAMS AND MILL WHEELS – A COMPLETE ENGINEERING MANUAL

tural materials for various applications. They even could be termed "tight specifications."

In Book VIII Vitruvius turns to "the discovery of water, the qualities of its special sources, the methods of water supply, and of testing water before using it." It turns out to be a curious mixture of shrewd observation, amusing explanations, and exasperatingly indefinite descriptions. We are advised to observe if any vapors arise from the ground at sunrise, indicating a possible spring. Also to look for nearby plants like the willow, but to beware of a long list of acid and poisonous waters, some of which bring death while others simply cause one's teeth to fall out "leaving only the orphaned gums."

He suggests a slope of 6 inches in 100 feet for water channels of aqueducts and prefers the plumb bob type of leveling device, the chorobates, rather than the Greek dioptra. While he describes various sizes and weights of lead pipe, he warns against lead poisoning resulting from such use and prefers earthenware pipes. His discussion of what are known today as inverted siphons is unfortunately almost impossible to understand.

Sundials and Machines

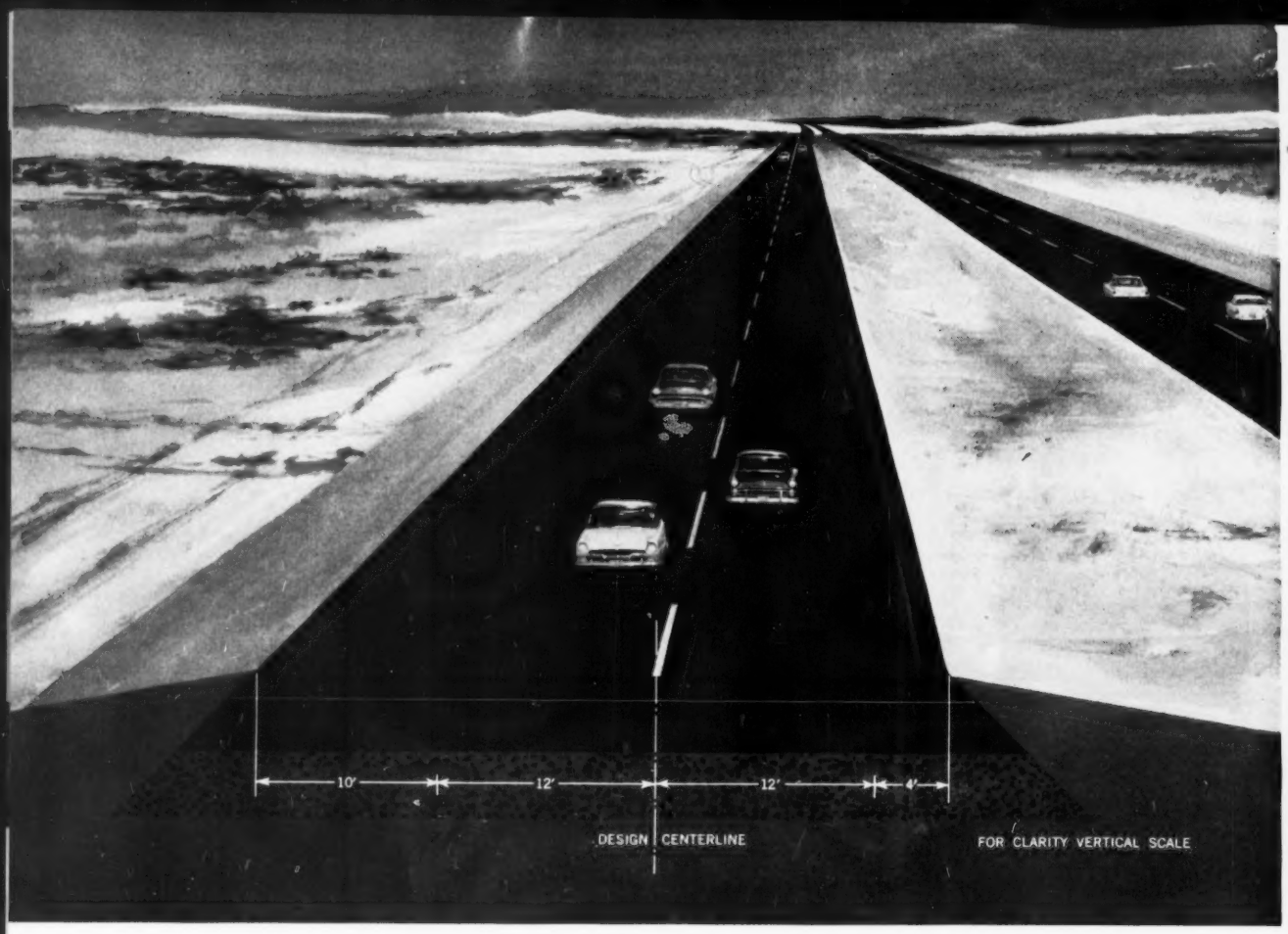
The two final books, IX and X, deal with sundials and machines. The former offers an excuse for an excursion into astronomy while the latter covers not only the construction devices, derricks, and hoists, but also military engines such as the catapults, ballistae, the tortoise, and the battering ram. The ancient form of bucket wheel, the tympanum, either as a treadmill device operated by manpower or turned by the current of a stream, also is described, as is the Archimedean screw-pump.

The 10 books of Vitruvius constitute a major volume – some 350 modern type pages – and the author evidently felt that he had dealt completely with his subject; "described every department of architecture," as he says. The drawings to which Vitruvius frequently refers in his text have unfortunately been lost. In fact, efforts to replace them were a special feature of many of the printed editions of his work. There is ample evidence, however, that no material part of his text has been lost – each book has its introduction and its closing statements and all 10 have survived intact.

One only can wonder why he failed to discuss such important work of the Roman *architectus* as bridges and highways. He mentions authors who covered these fields, but unfortunately their writings have been lost. So we must be grateful to the rascal, Poggio, who discovered the St. Gall copy of *De architectura* and preserved for us at least all that Vitruvius chose to tell. ▲▲

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1. *De architectura* (Vol. I and II) by Vitruvius, (translation by Frank Granger), Harvard University Press, Cambridge, Massachusetts, 1955.
2. *History of Civil Engineering*, by Hans Straub, (translation) Leonard Hill, Ltd., London, 1952.



Arizona's First Interstate

Experience with veteran 2-lane Asphalt



Arizona is a big state with a low population density—which means it needs plenty of roads. But there aren't millions of Arizonans to pay for them. Every dollar counts.

These are some of the reasons why most of Arizona's roads traditionally have been of economical Asphalt construction. Time and again, since the State began to pave, Asphalt pavements have stretched available funds over more and more of these long Arizona miles than could any other pavement type.

Now, along with the rest of the states, Arizona has launched a vast new road-building program. And even though more federal aid is available than ever before, these roads, too, are turning out to be Asphalt-paved. You don't have to look far for the reasons.



Arizona's veteran Asphalt-paved highways have proved themselves as rugged and durable as they were economical to build and maintain.

U.S. Route 66 between Winslow and Holbrook is an example. First paved more than 25 years ago (with Asphalt and sand!), this pavement is successfully supporting heavy traffic undreamed of when it was first built. "Double" trucks by the dozen barrel over it at 60 MPH. So does the bulk of Arizona's east-west traffic.

Now this veteran main artery, still in the prime of its life, is being given local traffic responsibilities. A new divided Interstate Highway (Route 40), carrying through traffic, will parallel it. The initial section of Arizona's new Interstate 40 is shown above. It is a 5.6 mile stretch between Winslow and Holbrook.



With no aggregate larger than ¾ inch available (and most under ¼ inch), only Asphalt construction could have been used to build this section of pavement up to Interstate standards. Total cost of the pavement structure was $1.75 per square yard!



Segment Asphalt-Paved!

pavements leads to decision

The cross section above shows you in detail how low-cost Asphalt materials were used to give this pavement lasting strength despite the scarcity of aggregate.



Notice, first, the use of Asphalt in the 3-inch base. This base, a sandy gravel, was road-mixed on the selected sub-base using RC-3 liquid asphalt.

Notice, second, (see right roadway above) that the 3-inch leveling course was asphalt plant-mix laid down in two courses. A novel between-course inter-lock was provided by "waffling" the lower course while still hot with a 4-inch square grid pattern, impressed about ⅜-inch into the surface. A tack coat was applied and a second course constructed. Then, a ½-inch wearing course was laid to insure a non-skid surface.

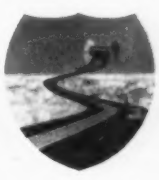
Notice, third, that both base and surface courses are uniform across the whole width of the road, shoulders as well as traffic lanes.

Notice, fourth, the use of Asphalt curb to provide controlled drainage, prevent embankment erosion and aid safety.

BEAT SCHEDULE BY TEN WEEKS

With today's equipment, modern heavy-duty Asphalt concrete pavement is being laid at record, reputation-building, tax-fund-conserving speeds. In this case, construction was completed 10 weeks ahead of schedule . . . in plenty of time to accommodate the bulk of the summer tourist traffic.

Modern Asphalt concrete pavement can help **you** speed your highway modernizing program. It provides, as well, strength, durability and economy in full measure. Specify it for your Interstate Highways. Primary and farm-to-market roads, too.



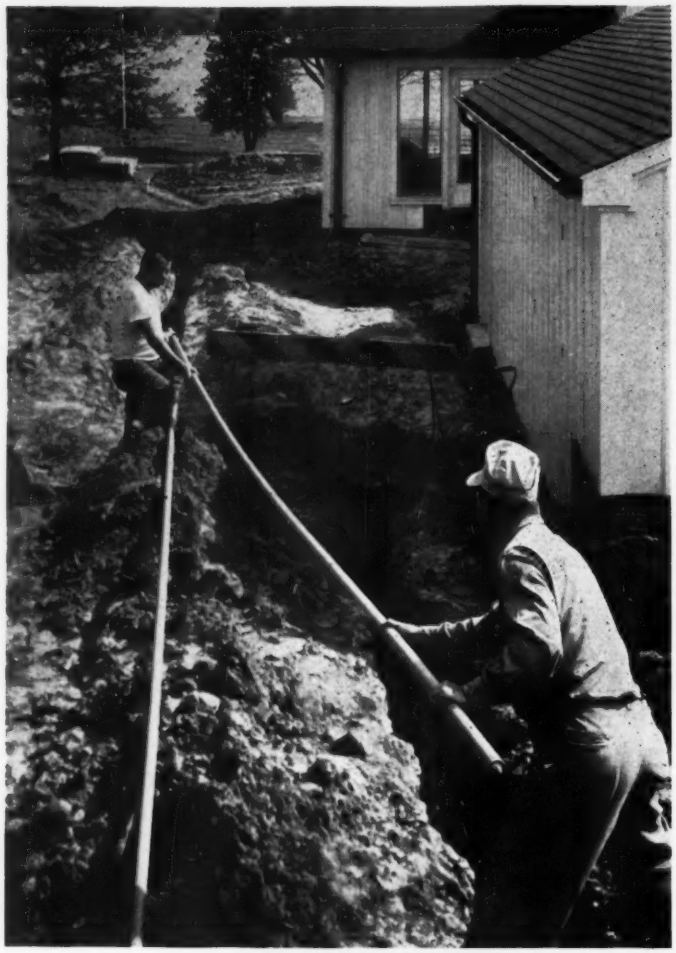
Ribbons of velvet smoothness . . .
***ASPHALT**-paved Interstate Highways*

THE ASPHALT INSTITUTE

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B.F.Goodrich Chemical *raw materials*



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The pipe in this natural gas distribution system is made of Geon rigid vinyl. Years from now it will be feeding gas to homes just as efficiently as the day after installation. This pipe stays smooth inside and out because it is not affected by the corrosive influences that affect ordinary pipe. No problems from salt water, chemicals, acid or alkaline soils, or galvanic corrosion.

Conduit or pipe made of Geon provides high tensile and impact strength. It stands up under pressure, resisting effects of fungi, bacteria, moisture, heat or cold. It makes a big hit with installation crews, since it is so light weight and so easy to install.

Engineers are taking advantage of the properties of versatile Geon polyvinyl material for this and many other types of applications. For information, write Dept. FG-2, B. F. Goodrich Chemical Company, 3135 Euclid Ave., Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.



1¼" diameter pipe of Geon rigid vinyl is being installed by Illinois Power Company in gas lines leading to homes at Decatur, Illinois. In addition, ¾" vinyl pipe is being inserted in reamed-out 1¼" iron pipe under streets to avoid breaking the pavement to repair leaking gas lines. Kraloy Plastic Pipe Company, Los Angeles, California, makes the pipe. B.F.Goodrich Chemical Company supplies the Geon rigid vinyl.



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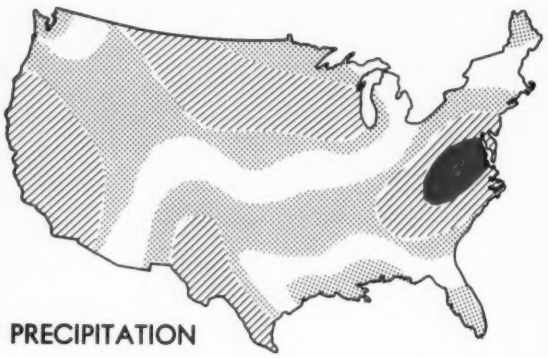
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GEON polyvinyl materials • HYCAR rubber and latex • GOOD-RITE chemicals and plasticizers

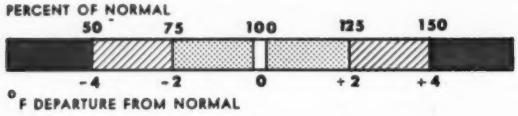
KRICK WEATHER OUTLOOK

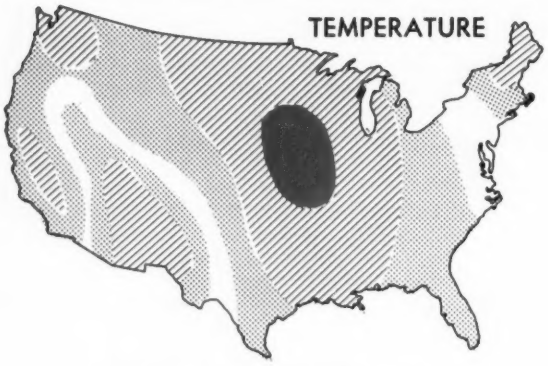
SEPTEMBER 1959

Prepared Exclusively for CONSULTING ENGINEER

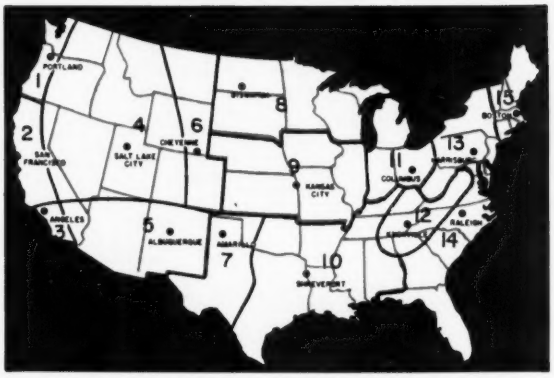


PRECIPITATION





TEMPERATURE



CONSTRUCTION DAY FORECAST LOCATIONS

CONSTRUCTION DAY CRITERIA

To be considered a construction day on these charts, the day's maximum temperature must be more than 38 degrees. There must be less than six inches of snow on the ground. There must be less than six hours of active precipitation during the period between the hours of 7 a.m. and 5 p.m. There also cannot have been more than one inch of rainfall on the preceding day.

SEPTEMBER HIGHLIGHTS

During September, relatively mild temperatures are in prospect over much of the United States. The area extending eastward from the Rockies to the Atlantic Coast should have warmer than normal temperatures, with the average monthly readings ranging from much above normal over the central plains to just slightly warmer than normal in the lower Atlantic coastal regions. Slightly warmer than normal temperatures also are expected over the northwestern portions of the country and the Pacific coastal areas. The New England area, however, will have near to slightly cooler than normal temperatures. Generally cool temperatures also are expected over the southwestern United States, with the coolest readings in comparison to normal likely in portions of southwestern New Mexico and southeastern Arizona. In broad terms, dry in the west and wet in the east is the outlook for precipitation. Look for near three quarters of the normal monthly totals over California and Nevada, and much below normal rainfall in a belt ranging from the base of the Rockies eastward to the Great Lakes region. Generally, much above normal moisture is indicated over the mid-Atlantic states, and in a belt extending westward through the Tennessee Valley. Much above normal moisture also is expected over the Llano Estacado of Texas and New Mexico, the Edwards Plateau in Texas, and the Rio Grande Valley. As a whole, construction weather looks favorable over much of the western and northern portions of the nation. Construction will be hampered somewhat by rainfall in the band through the southern one-third of the nation.



TEAR OUT ALONG PERFORATION.

These forecasts are prepared by Irving P. Krick Associates, Inc., the world's oldest and largest weather engineering firm. The forecasts are based on methods developed by this group at California Institute of Technology prior to World War II. After the War, the methods were adapted to high speed electronic computing machines to shorten the time required to solve the complex problems of the atmosphere. Ultra-long range forecasts, up to a year or more in advance, are now available. Information on other Krick weather services is available by writing to the home office of the firm at 460 South Broadway, Denver, Colorado.

CONSTRUCTION DAYS

SEPTEMBER 1959 ESTIMATES															
LOCATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
HIGHEST	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30
LOWEST	26	30	29	28	28	25	25	25	24	26	28	25	22	24	27
AVERAGE	27	30	30	29	30	29	28	29	28	29	29	28	26	27	29
ESTIMATE	27	30	30	30	30	28	29	29	27	30	29	28	26	24	28

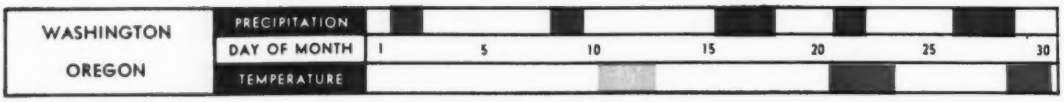
These estimated construction days for key cities in the United States should be interpreted as an average of estimated conditions over the forecast area. To obtain the best results, the forecast number of construction days should be compared with the temperature and precipitation anomaly maps and the timing estimates to determine theprobable number of construction days in your locality. The forecast construction days are based on average construction day requirements as defined under "Construction Day Criteria," and should be adjusted for individual operations.

OCTOBER AVERAGE AND RANGE*															
LOCATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
HIGHEST	30	31	31	31	31	31	31	31	30	31	31	31	31	30	31
LOWEST	16	28	29	25	30	25	26	21	26	26	28	25	26	28	22
AVERAGE	25	30	31	29	31	29	30	28	28	29	29	29	29	29	27

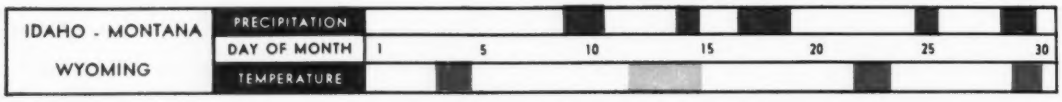
NOVEMBER AVERAGE AND RANGE*															
LOCATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
HIGHEST	26	30	30	29	30	30	30	27	30	30	27	29	29	30	27
LOWEST	16	21	24	16	22	15	21	6	18	21	13	21	18	22	17
AVERAGE	21	26	28	22	28	21	27	15	25	27	21	25	23	27	22

*Historical Average, Not a Forecast

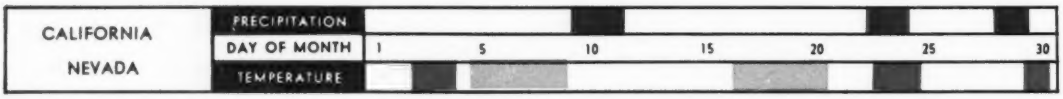
SEPTEMBER 1959 TIMING OF SIG



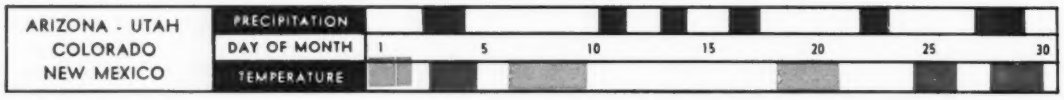
Near to slightly lower than normal precipitation totals are expected over most of this two state area during September, with the southern sectors having the driest weather as compared to normal. The 16th-18th and 27th-29th intervals should bring important storminess.



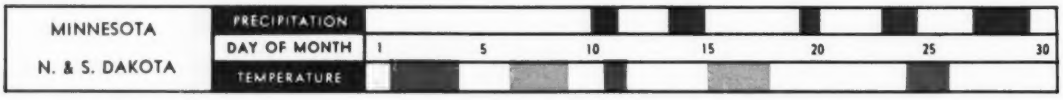
Look for near to slightly less than normal average precipitation over this area. The driest areas as compared to normal should be in eastern and northern Montana. Important moisture is anticipated during the 17th-19th and 28th-30th intervals shown on the timing bar.



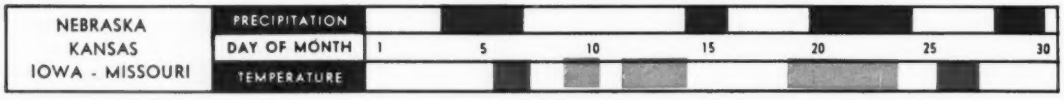
A much drier than normal September is on tap over this two state area. However, one of the first good fall storms may occur during the last few days of the month. Principally Nevada will be affected by the cool period shown for a day or two around the 4th.



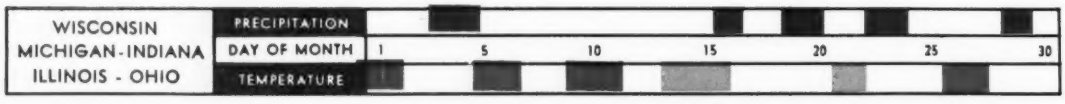
Precipitation totals are expected to range from near to slightly below normal in the west, to slightly above normal in eastern portions. The showers around the 3rd or 4th of the month will concentrate principally in the eastern regions of Colorado and New Mexico.



Warmer and drier than normal is the weather outlook for this area during September. Look for near freezing temperatures during the cool periods indicated around the 12th and the 26th of the month. Important storminess is contemplated during the 14th-15th and 28th-30th intervals.



Intermittently showery weather is expected during the 4th-7th interval, with the heavier concentrations likely in eastern Kansas, Missouri, and southern Iowa. The storminess indicated for a day or two around the 15th should affect principally the southern half of the area.

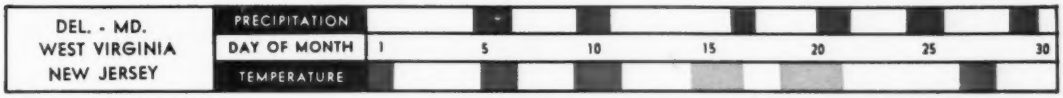


Slightly warmer than normal temperatures are anticipated over the Great Lakes region during September. The showers around the 16th or 17th should be heavy over the southern half of the area. Light scattered frost may occur in northern sectors during the second week of the month.

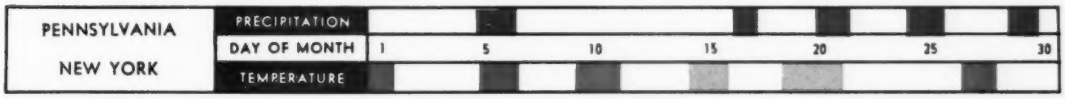
IGNIFICANT WEATHER EVENTS

AIN
NOW
VARM
OLD

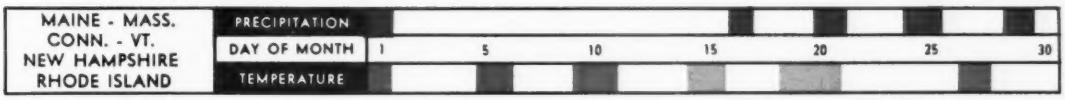
The timing bars below are intended to indicate periods of important general storminess and important departure from temperature normals in areas indicated. They are highly accurate over the area indicated, but are too general to pinpoint small local storminess or showers. Allow one day on either side of indicated storm or extreme temperature periods for general planning. Combination rain or snow shading indicates either one or both.



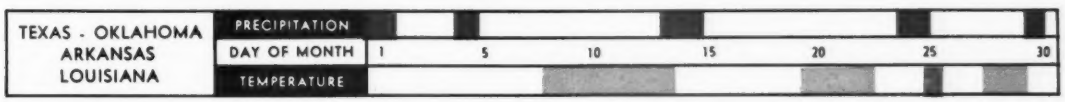
Near to slightly cooler than normal average temperatures are expected during September. Look for precipitation totals to range from near to slightly above normal. Nighttime readings should drop into the 40s and 50s during the cool intervals shown on the timing bar.



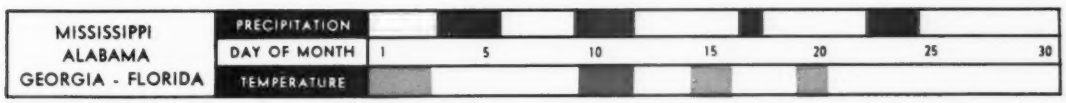
Slightly above normal moisture is contemplated over this two state area during September. Southern regions should have the heavier amounts as compared to normal. The storminess indicated for a day or two around the 25th should concentrate principally east of the Appalachians.



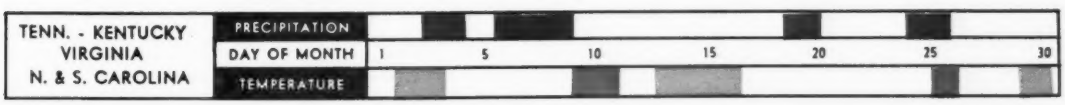
The New England states can anticipate near to slightly cooler and drier than normal conditions during September. Storminess may develop around the 6th and again around the 10th of the month, but should affect principally southern portions of the area.



Look for much above normal rainfall over southern and western Texas, and near to slightly above normal amounts over the remainder of the area. Frequent 90 degree temperature readings are expected during the prolonged interval from the 8th through the 14th of the month.



Slightly warmer than normal temperatures accompanied by near to slightly heavier than normal amounts of moisture are contemplated over the lower south during September. The heavier amounts of rainfall as compared to normal will occur in the northern areas.



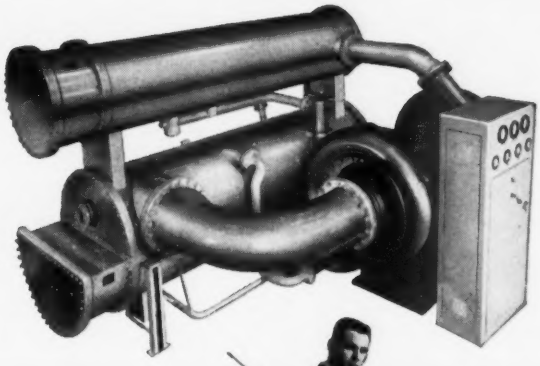
Much wetter than normal conditions are on tap over the upper south during September, accompanied by temperature readings ranging from near to slightly warmer than normal. The 6th-9th, 19th-20th, and 24th-26th intervals shown on the timing bar should bring important moisture.

Climate by Chrysler

...most versanomical way to air condition anything!



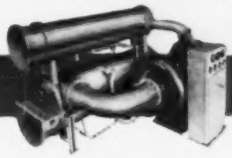
Versanomical—that's the word for Chrysler's Centrifugal Water Chiller. It's versatile: engineered for any air conditioning project from 125 hp to the largest. And economical: packed with special engineering features that cut operating and service costs. For example:



1. **True volute casing.** A Chrysler design exclusive that minimizes refrigerant turbulence . . . reducing horsepower load on the motor.
2. **Adjustable guide vanes.** Unique airfoil design employs new principles to increase compressor efficiency to the maximum while maintaining operating stability.
3. **Automatic operation.** Factory-assembled control console including all required safety controls, indicator lights and gauges.
4. **Automatic purger.** Removes non-condensable gases and water vapor. Prevents contamination of refrigerant system, cuts service costs.
5. **Interlocked lubrication.** System protects motor bearings with a constant flow of oil. Compressor can't run unless oil pump operates.



Chrysler Centrifugal Water Chillers are factory pre-tested under simulated operating conditions to assure peak performance. Get complete engineering data and technical assistance from your local Chrysler Applied Machinery and Systems sales office. Or write: Airtemp Division, Chrysler Corporation, Dept. X-99, Dayton 1, Ohio. In Canada: Therm-O-Rite Products, Ltd., Toronto, Ont.



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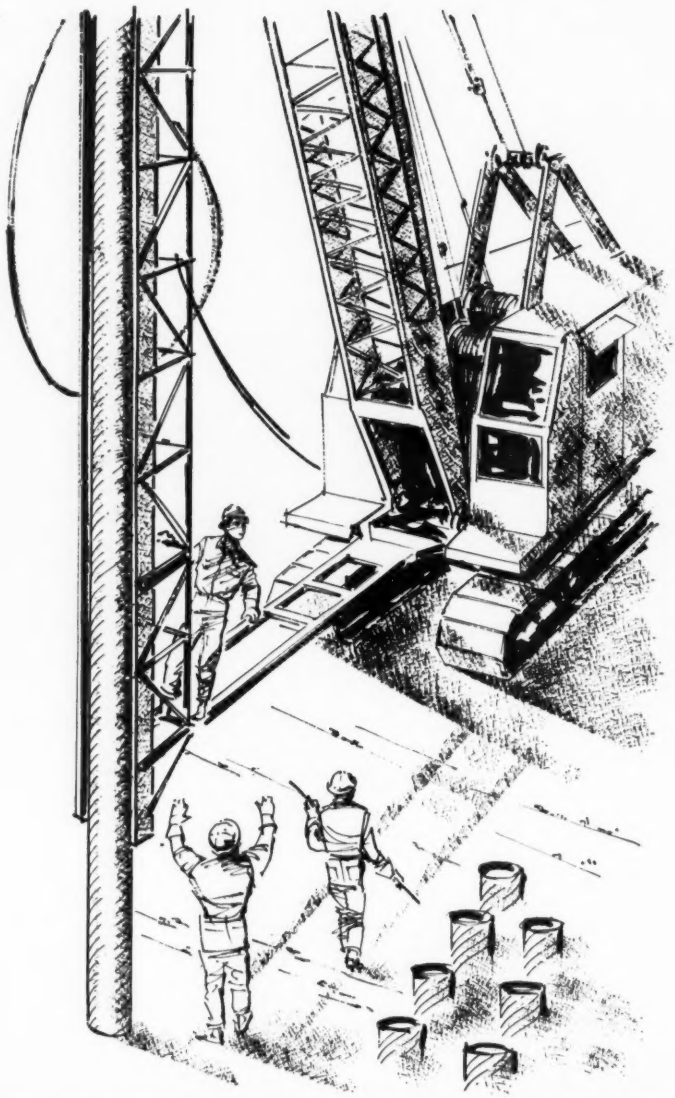
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Armco HEL-COR Pile Shell is a continuous lock-seam corrugated metal pipe made on automatic machines.

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says C. V. Reichelt, Director of Engineering, Chas. Pfizer & Co., Inc.



Pfizer headquarters: executive offices and research laboratories in Brooklyn, New York. In the associated production plant, a modern Combustion VU-50 Boiler has been meeting essential heat and processing requirements during the past four years by producing 140,000 lbs of steam per hour.

Pfizer's Vigo Plant relies on four Combustion VM Boilers fired by C-E Spreader Stokers for economical heating and processing. Well suited to fill local needs, these units are each rated at 30,000 lbs of steam per hour at an operating pressure of 150 psi. In various Pfizer plants, nine C-E units have a total steam production capability of 740,000 lbs of steam per hour.





At this large Pfizer fermentation and organic synthesis plant in Groton, Conn., a new C-E Vertical-Unit Boiler, Type VU-50X, has just been placed on the line. Rated at 165,000 lbs of steam per hour — a new high for Pfizer — it joins three other oil fired C-E boilers, two VU-40 units and one VU-50 unit, already in service at the plant. Each is rated at 115,000 lbs/hr.

When Chas. Pfizer & Co., Inc., recently put into service a new C-E Vertical-Unit Boiler in their Groton, Conn., fermentation and organic synthesis plant, they were capitalizing on long experience. Eight previous C-E units, three of them at Groton, had been producing steam efficiently in Pfizer plants since 1948.

Mr. C. V. Reichelt, Director of Engineering, describes Pfizer's experience with its latest C-E unit as follows: *"The new 165,000 lb/hr boiler . . . is proving to be a very satisfactory and dependable unit. Particular commendation is made of the refinements with regard to air pre-heater and fly ash arrestors which Combustion Engineering included in their design. Special mention is also made of the fine job that was done in getting the boiler on the line on time in spite of a tight schedule for fabrication and erection. This boiler is the fourth and largest C-E boiler installed at our Groton facilities."*

With three other C-E Boilers at Groton, this unit is now producing steam for power and process in the production of the well-known Pfizer antibiotics such as Terramycin as well as for a wide range of pharmaceuticals and chemical and agricultural products.

Pfizer's experience with C-E boilers extends beyond Groton, too. At Terre Haute, Indiana, the company's Vigo Plant uses four Combustion boilers fired by C-E Spreader Stokers; and at the Brooklyn Plant, the company's original "shop", dating back to 1849, another C-E Boiler is entering its fourth year of service.

Today, in more than 100 countries around the world, Pfizer "Science for the world's well-being" contributes to the advance of medicine, agriculture and industry. Combustion Engineering is proud to have a share in this march of scientific progress.

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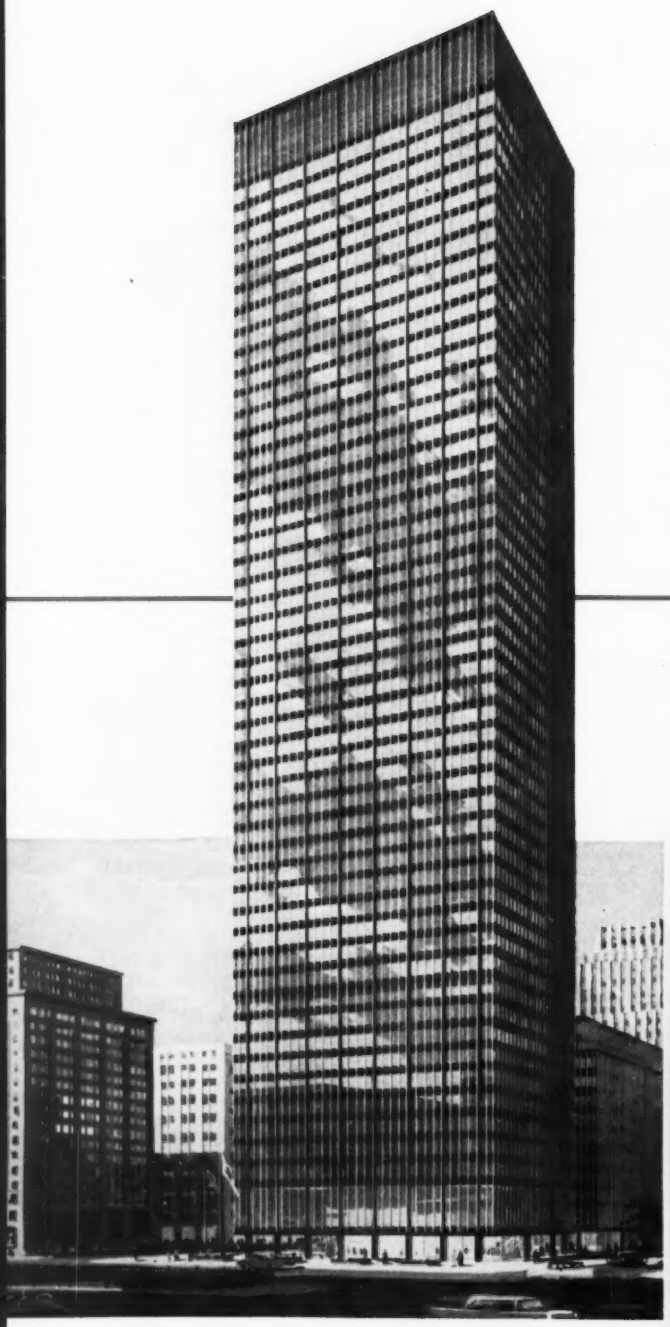
Concrete work in

is reinforced with

JUST north of Grand Central Station a new skyscraper is rising to join New York's storied skyline. It is the 52-story Union Carbide office building. During the razing of the Hotel Marguery, formerly on the site, and the erection of the new skyscraper, Grand Central trains operated below—on time, without interruption.

USS American Welded Wire Fabric was used throughout this building to add strength and durability to concrete work. To meet the differing requirements of

USS American Welded Wire Fabric style 22-1212 was used to reinforce the thin layer of concrete encasing the structural steel for fire protection. The closely spaced small members of fabric ideally suit it for this reinforcement to prevent crack-causing stresses due to temperature changes and structural deflection. The fabric readily shapes to the steel and retains its rigidity in the bent form. Large sheets can be applied to speed construction.





Architect:.....*Skidmore, Owings & Merill*
Consulting Engineer:.....*Syske & Hennesey*
General Contractor:.....*George A. Fuller Company*
Concrete Contractor:.....*Knickerbocker Construction Company*
Fabric Distributor:.....*Carroll-McCreary Company, Inc.*

new Union Carbide Office Building

USS American Welded Wire Fabric!

concrete slabs, fills and fireproofing, three USS American Welded Wire Fabrics—of varying weights—were used.

American Welded Wire Fabric has long been used successfully and economically in practically every form of structure. It has an enviable record of successful structural application in the world's tallest and largest buildings. For more information on American Welded Wire Fabric, write to American Steel & Wire, 614 Superior Avenue, N. W., Cleveland 13, Ohio.

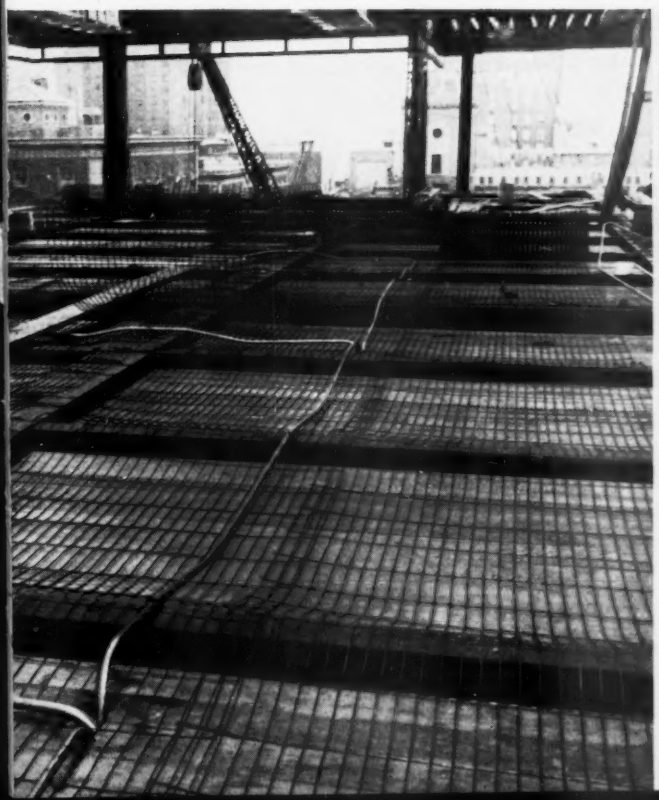
USS and American are registered trademarks

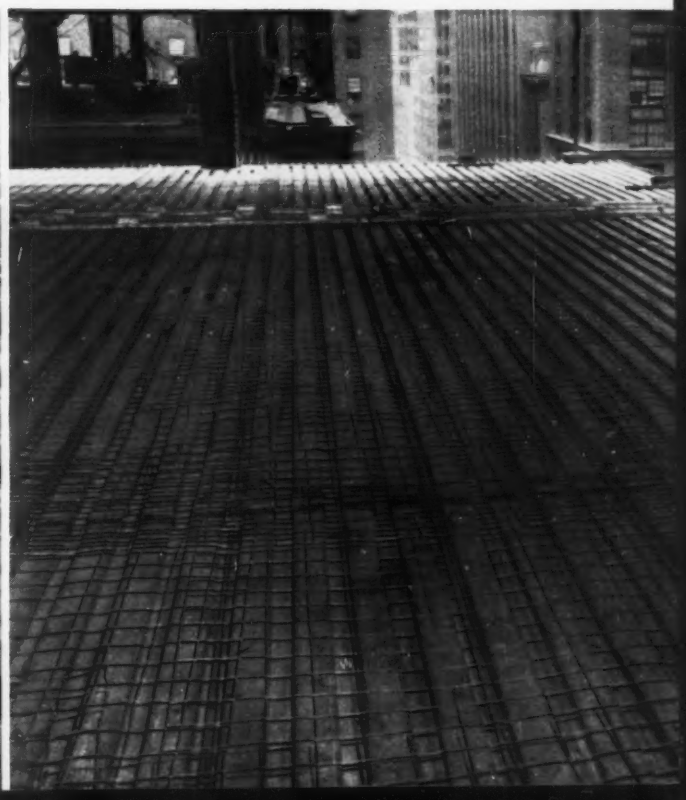
USS American Steel & Wire Division of United States Steel

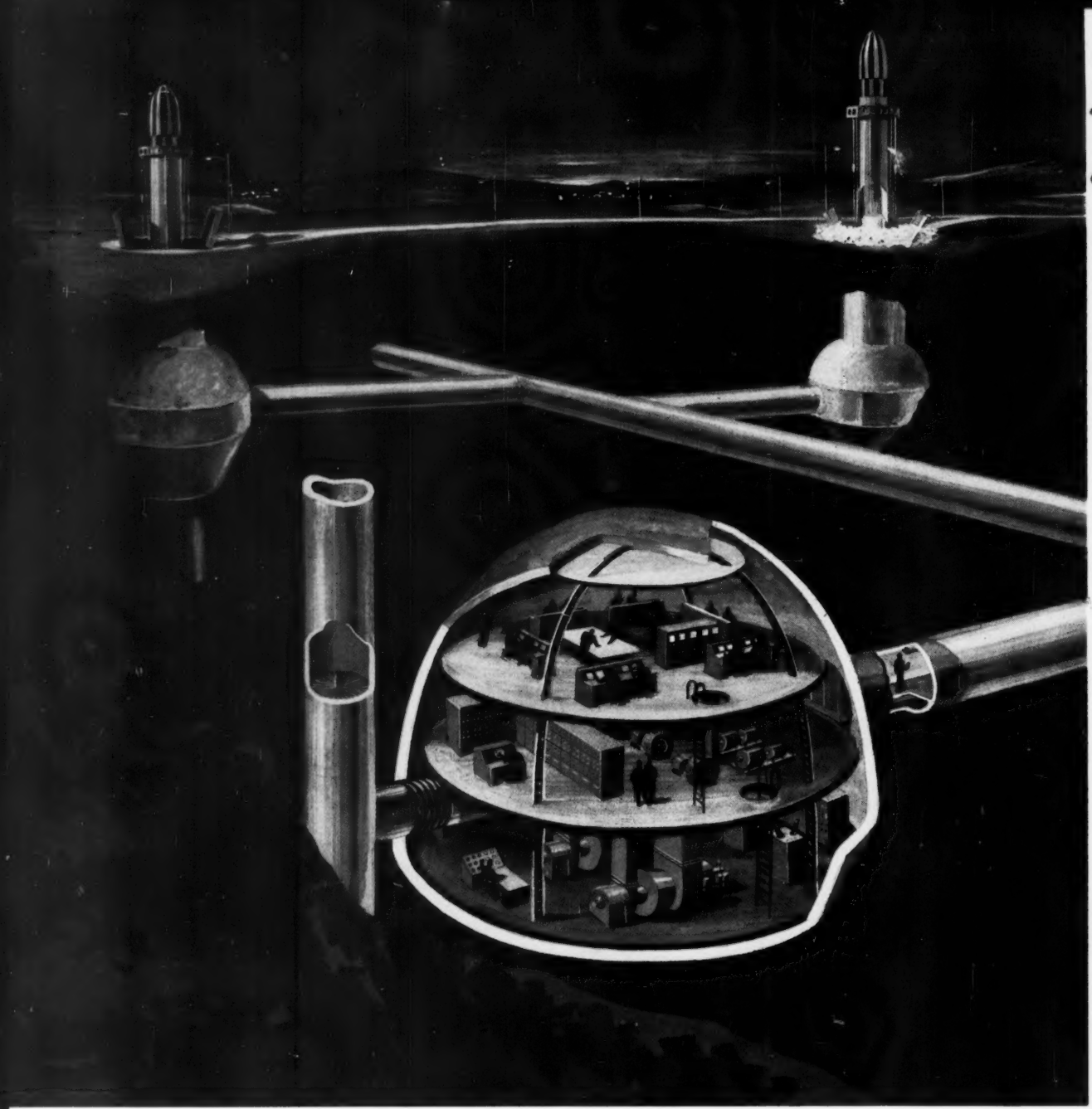
Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, Distributors Abroad

Short span concrete slabs are structurally reinforced with a rectangular style of USS American Welded Wire Fabric. The high yield point of the cold-drawn wires permits higher working stress, thus reducing the amount of steel to be handled and installed. It is easily draped and placed at points of maximum stress due to positive and negative movement. Long fabric rolls speed installation and assures continuity of slab action through continuous reinforcement.

The designers and owners specified that distributed reinforcement be used in the concrete fill over cellular metal decking to prevent temperature and shrinkage cracking. USS American Welded Wire Fabric style 44-1212 was selected. The small diameter closely spaced wires provide the needed protection against unsightly cracking.







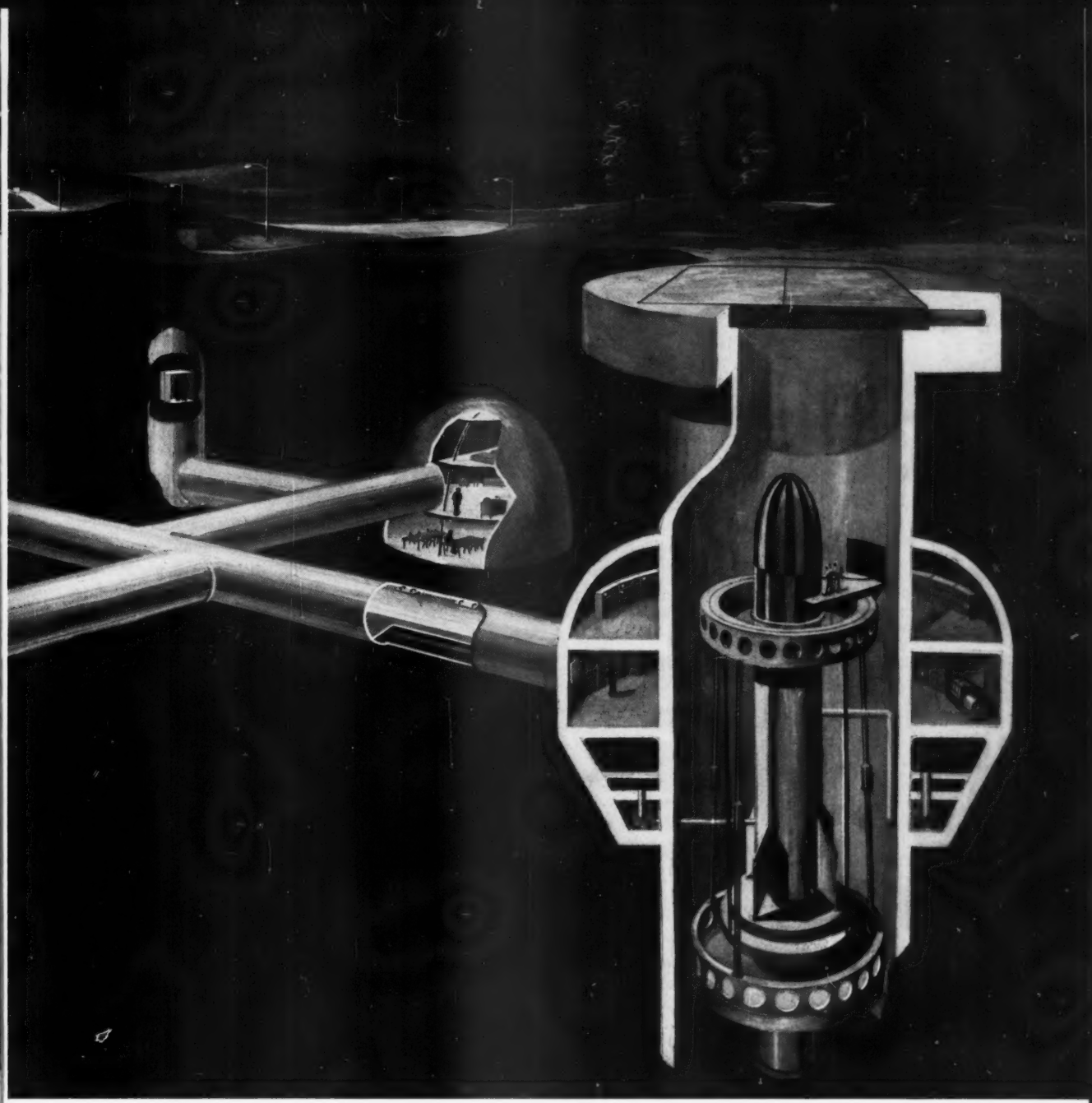
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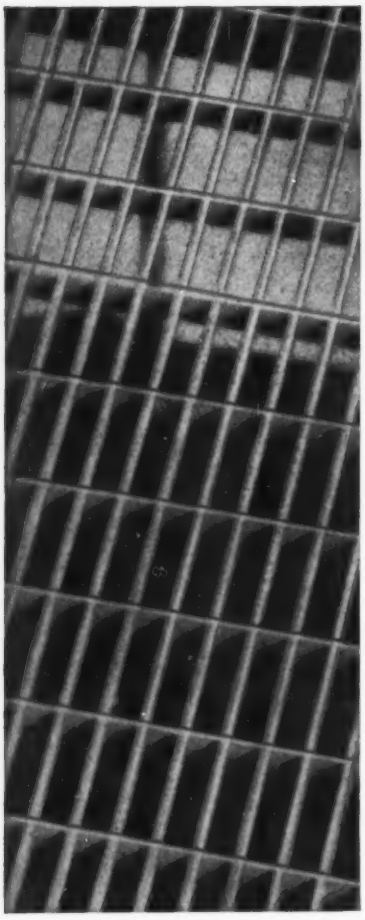
Daniel, Mann, Johnson & Mendenhall & Associates	Architect-Engineer
USA Corps of Engineers, Omaha District Office	Contracting Office
Morrison-Knudsen & Associates	General Contractor
Fishbach & Moore	Electrical Contractor
Ling-Howard Electric, Inc.	Electrical Contractor

Artist's conception of a possible hardened missile site, showing in blue some of the equipment which Westinghouse can supply. Copies of this illustration suitable for framing are available when requested on your letterhead.

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Field Notes



MARJORIE ODEN
Eastern Editor

CONSULTANTS who are interested in the quality as well as the quantity of future engineers should take a look at a unique program at Columbia University in New York City. The results of these intensive Saturday courses for high school students have amazed even the program's professor-creators.

The Science Honors Program began more than a year ago with a grant to Columbia's School of Engineering by the Hebrew Technical Institute, which was seeking new and imaginative ways to put some life into America's lagging education in science and engineering. Columbia's group set out to:

¶ Select some highly gifted teenagers and supplement their regular high school science courses with really modern science, adding that element of creative and rigorous investigation which the development of scientific gifts calls for but which conventional school programs rarely have.

¶ Give students prestige analogous to the prestige conferred by the interscholastic athletic competition, making scientific and mathematical excellence more honorific in the schools.

¶ Demonstrate how far and fast able students can go in advanced scientific subjects; demonstrate that a sound beginning can be made in many scientific areas conventionally "reserved" for college; and demonstrate that the traditional sequences in curriculum — in which what is modern and exciting generally is made to wait on what is routine and archaic — need not be so rigid.

¶ Develop new course material for high school science, with both a "guidance" function of presenting to the imagination of the students a richer and more modern range of scientific fields, and an instructional function of insinuating more challenging matter — using up-to-date technology for illustrative material and using sharper analytical technique — in the now obsolescent syllabi.

Initial Program

When the plans for the program were announced, the response was overwhelming. It had been planned to take 60 students from schools within commuting distance of Columbia's Morningside Heights campus. The students were not necessarily to be future engineers and scientists; the schools were to select youngsters who had shown a keen intellectual interest in the sciences and who had high I.Q.s. ("We do not put a great deal of emphasis on the I.Q. tests, however," explained Donald Barr, director of the program. "No good guidance person does. The same student sometimes can have a variance of 30 points on an I.Q. test over the period of a year.")

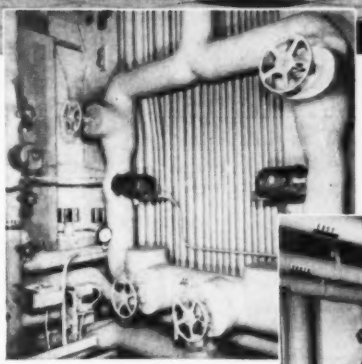
Some 220 nominees were given qualifying tests — tests originally designed for college freshmen majoring in engineering sciences. It was decided to increase the number of students in the program to 75 — and then, after a look at the scores made by these high school

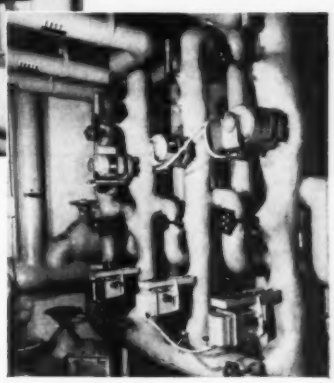


International Minerals & Chemical Corporation, Administrative and Research Center, Skokie, Ill.

Architects and Engineers: Perkins & Will
General Contractor: Turner Construction Co.
Mechanical Contractor: M. J. Corboy Corp.

"ENGINEERED FOR THINKING" ...WITH 22 QUIET B&G BOOSTER PUMPS





B&G Boosters installed in various heating circuits.



B&G BOOSTER PUMP

Hydro-Flo SYSTEM

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Dept. FW-70, Morton Grove, Ill.
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International Minerals and Chemical's new administration and research center, Skokie, Illinois, has been described as "engineered for thinking." In keeping with that objective, twenty-two *quiet* B&G Boosters were selected as the pumps for the heating circuits of the four buildings and the snow melting panels.

B&G Boosters and larger Universal Pumps are designed and built specifically for circulated water heating and cooling systems, in which they satisfy the all-important requirement of *silent, vibrationless* operation. Over 3,000,000 are today installed in such systems.

Among the features of B&G circulating pumps are specially built, more costly motors, tested for quiet running...oversized shafts of hardened alloy steel... long sleeve bearings...noise dampening spring couplers...oil lubrication and leak-proof mechanical seals. They can be serviced without removing from the line.

juniors and sophomores, to 150. More money was needed, and the Fund for the Advancement of Education (Ford Foundation subsidiary) matched the Hebrew Technical Institute's grant of $25,000.

During the first semester, the students were divided into two groups. One got a series of lectures and laboratory visits called Fundamental Concepts in the Modern Sciences. The subjects ranged from the genetics of marine fungi to switching theory. No effort was made to separate mathematics, engineering and "pure" science. "Such distinctions are artificial anyway," said Barr, "and the differences as they are known to high school students have no relation to reality at all. So we avoided the whole issue. If you asked a student, at the end of a lecture, 'Was this physics or was it engineering?' he would not be able to tell you. And that is as it should be. We do not want our brightest youngsters to fall in love with labels and titles; we want them to fall in love with work and ideas."

The other group took a survey course in the Methods of the Modern Sciences, in which they learned how to design an investigation and carry it out as an individual project under the guidance of a University staff member.

"Too much emphasis has been put on teaching science step by step. Teachers make a fetish of the syllabus. Some teachers think that if you do not learn how to make oxygen in a test tube in October, you cannot possibly learn any other chemistry in November," Barr explained. "We took the opposite view. If the concepts of modern science are closely and subtly woven together in a tight logical fabric, as the formalists say they are, then it should not matter so much how you move from one point to another or where you begin. As a matter of a fact, we jumped from topic to topic without trying to secure all the logical connections. We found that the students were capable of doing that for themselves."

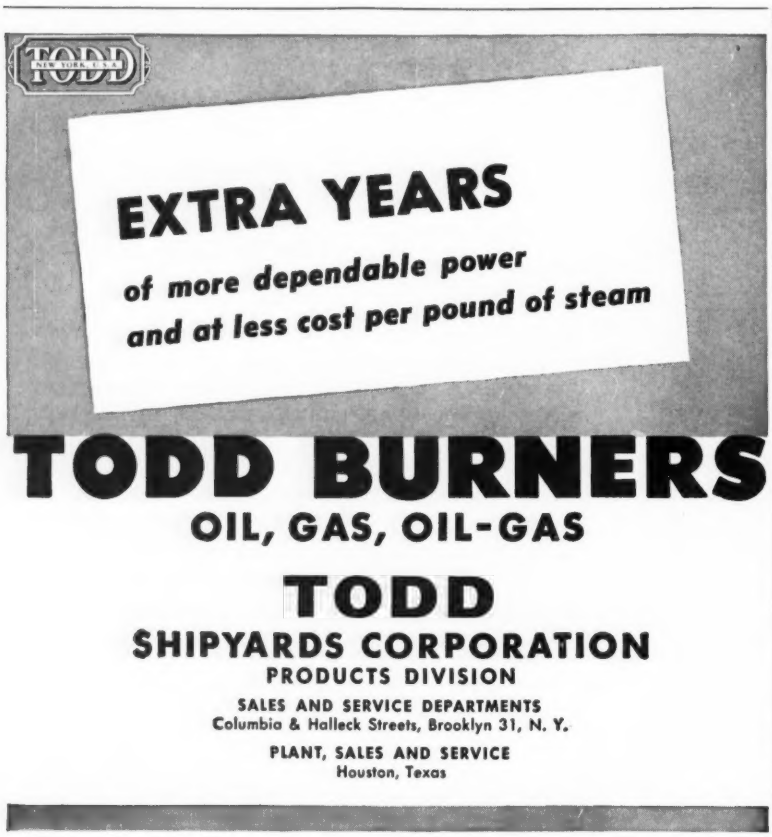
Capabilities Surprising

And indeed the students were capable. Ranging from 12 to 18 years old, these girls and boys had, as one professor put it "more penetrating ideas, and were quicker to grasp an idea, than the ordinary college student." The lecturers went on the principle that if one third of the students understood everything said including the mathematical derivations, the middle third followed the main lines of thought, and the lower third caught a few concepts and simply heard about new fields of interest, the program fundamentally would be striking the right level.

In the Methods group no ceiling was put on the students' ambition in designing projects. One boy began building "a variant of the Stein-Gerlach machine for demonstrating the quantization of the spatial orientations of the electric fields due to the outer electrons of atoms." He still is working with it in the University's laboratories, and plans to continue his researches during the summers. Robert Strom, a 12-year-old eighth grader, designed and built a random access translator which embodied ideas on information theory he learned at an electrical engineering lecture.

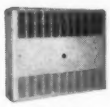
In connection with the courses, luncheons were given at the Faculty Club each Saturday. Ten tables were reserved, with one professor and five students sitting at each. The students talked over their research projects, their career plans, and their problems in choosing the right colleges, with eminent men in their particular fields.

One mathematics professor telephoned the director after one of these luncheons and enthusiastically reported that the five boys at his table were better than university students. One of them, a high school senior, had in five minutes been able to grasp and develop, from definitions scribbled on a





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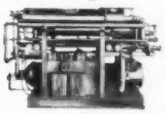
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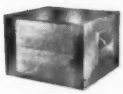
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napkin, concepts it had taken two weeks to teach a graduate class.

Spring Semester Electives

In the spring semester students were allowed to choose an intensive course in one of five subjects: Stoichiometry (in which the professor reported that they compared favorably with chemical engineering students in the University's junior class), Probability and Statistical Inference, Population Genetics, Physics of Electricity, and Architecture.

A professor reported, "The students are fresh and enthusiastic and because they have not been told certain subjects are difficult, they find them all, apparently, easy. I really am astonished by how much material, some of it literally on a graduate level, can be understood and absorbed by these students, not all of whom are by any means geniuses. This is what is shocking; these students will now spend four or more years supposedly studying what I am sure they can learn in less than two. It is interesting to speculate what might be done with bright 8th graders."

Faults in Present System

The experiment has highlighted a number of glaring faults in the American educational system. Perhaps the most obvious is that bright children are left to flounder and get bored while the teacher spends her time with the borderline students who she is afraid may not pass the course. "The slow ships are allowed to hold up the convoy," Barr complained.

Why is it so vital to work with students on a high school instead of a college level? The answer, Barr said, is that it is during high school that a student begins to commit himself to his career. Although the final decision sometimes can be – and should be – delayed as long as the junior year in college, the student already has to have some idea of what he wants to do when he selects his college. This is especially true of potential engineers, because most engineers go directly into engineering schools rather than to liberal arts colleges.

"The fact is, comparatively few of the brightest students go for engineering and the situation is probably getting worse." Why? Barr blamed the present high school arrangements. "Under the present set up, the student chooses engineering when he has, at most, two years of physical science in high school. Usually, in fact, he only has chemistry or physics, but not both. In these classes, he probably has encountered many engineering subjects, but they have not been called engineering. A youth is fascinated with the electronics he encounters in his physics class; so he thinks he wants to be a physicist, not knowing that his real interest lies in electrical engineering.

"Moreover, much of the technology that is used as illustrative material in conventional high school courses is shockingly obsolete. One thing that engineers could do would be to set up good summer jobs for high school science teachers in various fields of modern technology, so that these key people would convey some of the sophistication and excitement of modern engineering to the students.

"Another difficulty is that values have changed. Youngsters today grow up with the idea of joining a large corporation and getting lifelong security. No longer do kids dream of independence. The universal aim in our society is apparently to be a beloved servant, not to be master of one's fate. Even those students who are interested in engineering, therefore, tend to head for industrial jobs rather than consulting work. By the time they go to college or engineering school, these attitudes are so deeply ingrained that I doubt if even the most persuasive consulting engineer could attract the youngsters away from the security that industry promises. If you want more



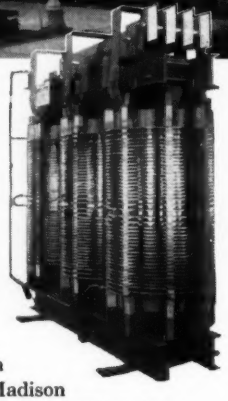
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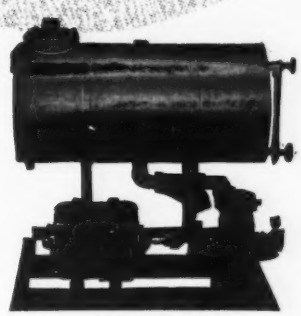
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consulting engineers, you have to tell your story much earlier.

"Of course, there are some youngsters who do have the old ideal of independence, who have the entrepreneur spirit. But usually these are attracted to 'pure' science rather than engineering, because individual effort is more stressed in academic science than in industrial employment, and they have never heard of a consulting engineer. A lot of the individualists go into medicine, which combines a good deal of science with the old jungle atmosphere. I doubt," Barr said, "whether college engineering recruiters ever get a look at the individualists."

Teaching Problem

Science education in this country, Barr said, is very timid and very conservative. The timidity of science teachers is chiefly due to their inadequate preparation in subject matter. Very simply, they are afraid that if they cut loose from the prepared syllabus and the familiar printed text, they will get lost. Students will ask questions the teachers cannot answer. Even teachers who are trained in their subjects suffer from these fears.

Barr cited the experience of a colleague in another engineering school who is giving an NSF-supported summer institute for high school chemistry teachers. This professor started his course by giving the class the standard ACS chemistry test; the scores of these high school chemistry teachers ranged from the 98 percentile all the way down to the 3 percentile. "How can you undertake a really thorough revision of high school chemistry when you have to work through teachers as various as that?" Barr asked.

"In addition, the teacher shortage is so acute that many people are teaching science 'out of license.' You may find music teachers or physical education teachers covering mathematics or biology classes because there is no one else to cover them."

No one else? How about engineers? "One of the results of our experiment is to show that teaching high school kids is not the black art it is supposed to be. At least with the brighter ones, it is not really necessary to know all the elaborate pedagogical theory that the certification authorities insist on. If I were a high school principal and had to choose between a swimming coach and a working chemist to cover a chemistry class, *I* would choose the chemist. That is not the way the authorities usually look at it, though. They think that the technique of teaching is more important than the subject taught. So they — or the law—would choose the swimming coach. In the Science Honors Program we have found that the technique of teaching grows quite naturally out of a full knowledge and love of the subject taught."

If engineers want to take a hand in improving science education where it needs improvement the most, and where the students are really ripe to be introduced to the excitements of the engineer's art, they can do a little tooth-and-nail work and get past the licensing authorities and take over some of the high school science classes in their communities.

Textbook Problem

A strong conservative force is the textbooks. The material used in today's texts is sometimes 50 years out of date. A few modern references, such as nuclear developments, are inserted, but mostly the material is antediluvian. Barr explained, "Textbooks are expensive to produce, and publishers are not gamblers. They have to recognize the timidity of the teachers. Also most school systems cannot afford to replace all their books at one time, so they buy a specified number each year and give one section of a course new books and another section old books. They do not want to have one half the students



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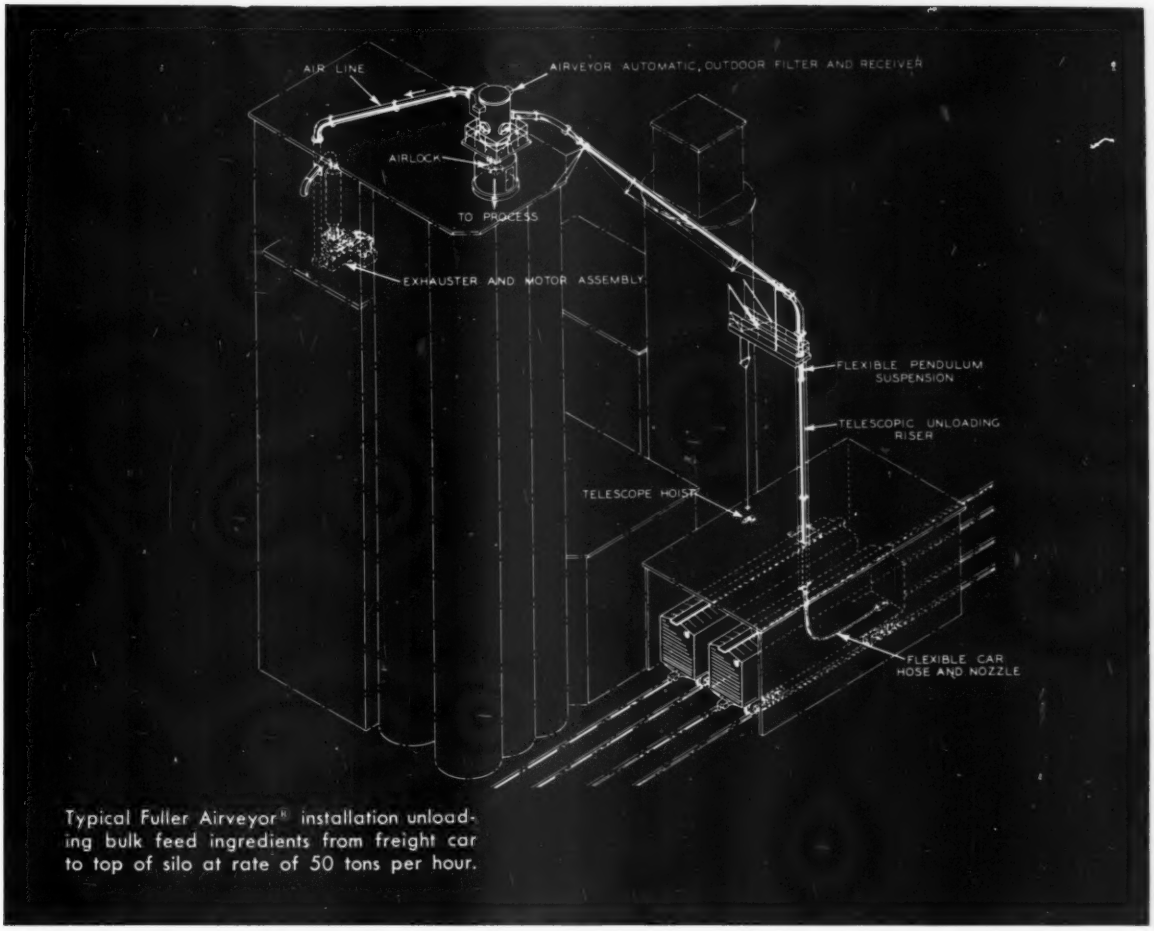
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50 years ahead of the others, and they cannot ask a teacher to straddle a half century. Besides, if you change the textbooks this much, it would involve changing the Regents' Examinations and such standardized tests. As you can see, it gets complicated."

The directors of the Science Honors Program are planning to introduce more modern technology and improved scientific material into high school courses step by step, by publishing a series of "units" based on the material they develop at Columbia. Those teachers who are confident enough and whose students are good enough thus can introduce a unit or two of this advanced material into a course without necessitating a wholesale revision of texts or tests.

The booklets, perhaps 15-20 pages in length, will deal with such subjects as X-ray diffraction in metals, polymer chemistry, and Boolian algebra. "That might scare some teachers initially, but at this level a teacher could refer interested students to reference books without too much loss of face," Barr commented. "Thus we can prepare for the eventual modernization of the courses."

Guidance Problem

Another obstacle to bright students' becoming engineers is the typical guidance counselor. Barr explained that the guidance departments are understaffed and therefore have to spend a disproportionate amount of their time with the now-or-never cases — the behavior problems and the borderline students who are not sure whether they can go to college or not.

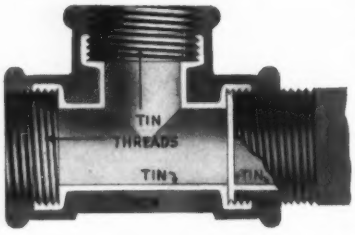
Of all the professions, engineering is the least understood by guidance counselors. A high proportion of the counselors are women who have been conditioned from childhood to stay clear of science, particularly engineering. "Engineers make such masculine noises," Barr said, "that they build up the image of the engineer as a rough-and-ready, rather low-brow character in field boots hacking his way with a machete through the Amazon jungle while carrying a transit on his shoulder and a slide rule in his teeth — or else as a grease monkey. Under the circumstances, however well-intentioned the guidance counselors may be, they cannot be expected to help the student make an intelligent selection of an engineering career."

How can the consulting engineer help guide the bright students into engineering careers? "Don't take the whole junior high school out to watch a construction crew dig a foundation. Instead, take the honors class in physics or chemistry or mathematics to visit some of the more high-brow areas of your business. Show them something like your computer set-ups or your photogrammetry equipment. Stimulate their intelligence," Barr suggested.

Though sponsored by the School of Engineering, the Science Honors Program does not emphasize engineering. Instead, it deals with all the sciences and engages the student's interest. Then the student frequently learns that an engineering school is the best place to advance his knowledge along the lines of his own choice.

"You might call it strategy," Barr explained. "The engineers have done such a poor job of getting their message across to these gifted students that we do not attempt directly to say or unsay anything. We let the engineering material itself get its message across, and then we show the label."

What will happen to this program in the future? "We would like to continue it for at least five years, experimenting with curriculum and with the selection of students. Right now," Barr said, "we are waiting to see if the Fund for the Advancement of Education will again match the Hebrew Technical Institute's grant so that we will have enough money to carry on the program for another year." ▲▲

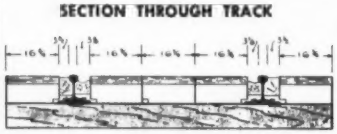


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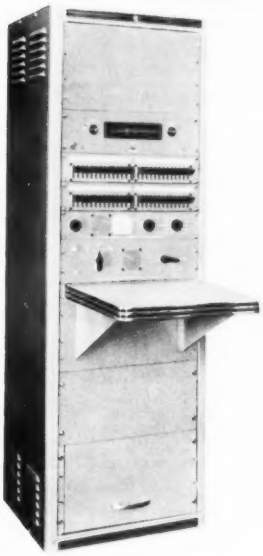
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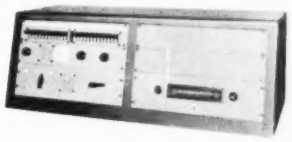
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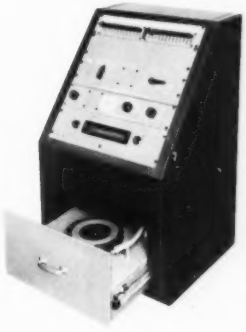
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Flexibility of Design

RCA's Modular Sound Control System assemblies are mounted on 19 inch panels and stocked as standard units.

Planning and specifying an RCA system is greatly simplified—merely requires determining the functions to be accomplished by the sound system and selecting the standard assemblies and cabinet which best match the requirements. The specified elements are prewired with plug-in connections; are custom assembled by factory experts, and shipped ready for installation. Once one of these flexible systems is installed, the modular-construction concept makes later expansion easy. Service, too, and parts replacement become greatly simplified.

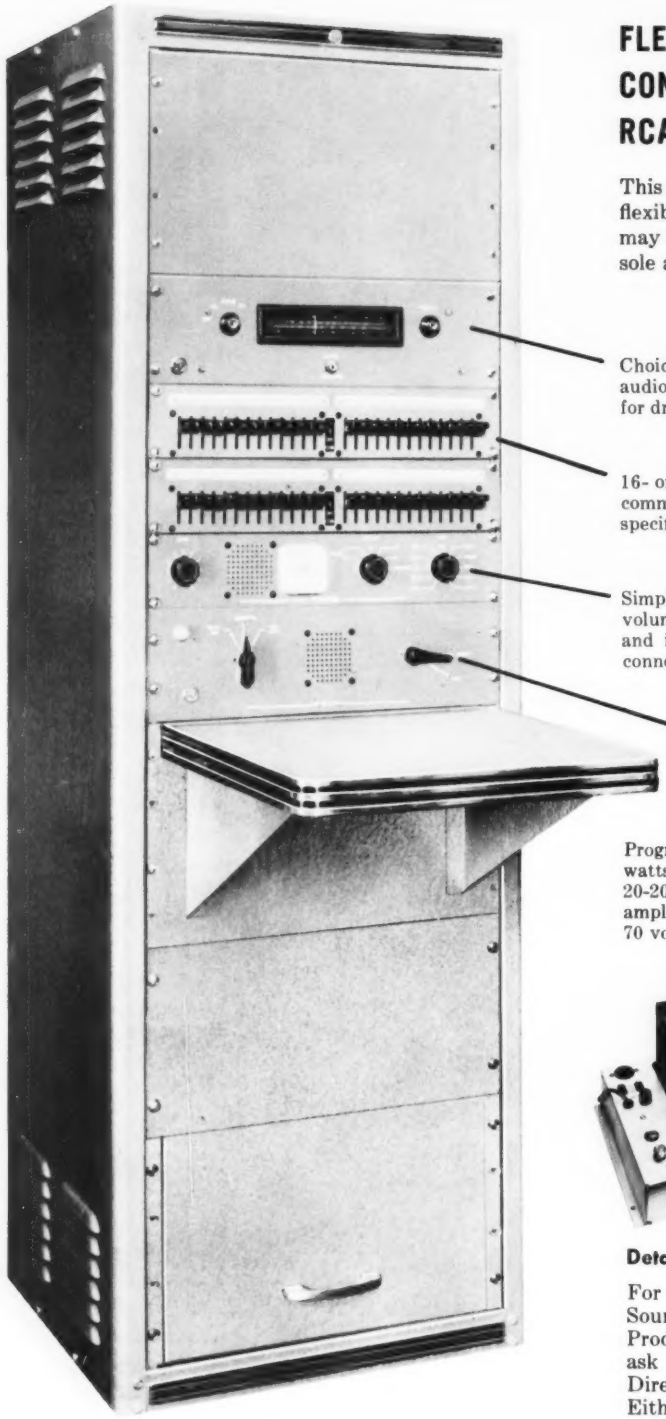
Simple to Operate

Simple operation combined with flexibility are characteristic of RCA's modular design. The number of operating controls, switches and knobs have been reduced to essentials without detracting in any way from the functions of the system. The program panel, for example, has only three controls. The intercom panel is equally simple and incorporates a combination monitor-loudspeaker and microphone. It also features RCA's single "ALL-CALL" switch that instantly connects all loudspeaker locations for emergency announcements.

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Reliable performance at lower cost is an inherent advantage of these new systems. Installation is readily accomplished, since the systems are shipped with all units mounted in place. Before leavingthe factory, the individual assemblies are tested and the entire system is checked out to meet RCA's rigid quality standards. Components are readily accessible for service and parts replacement.

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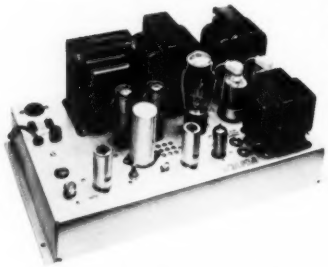
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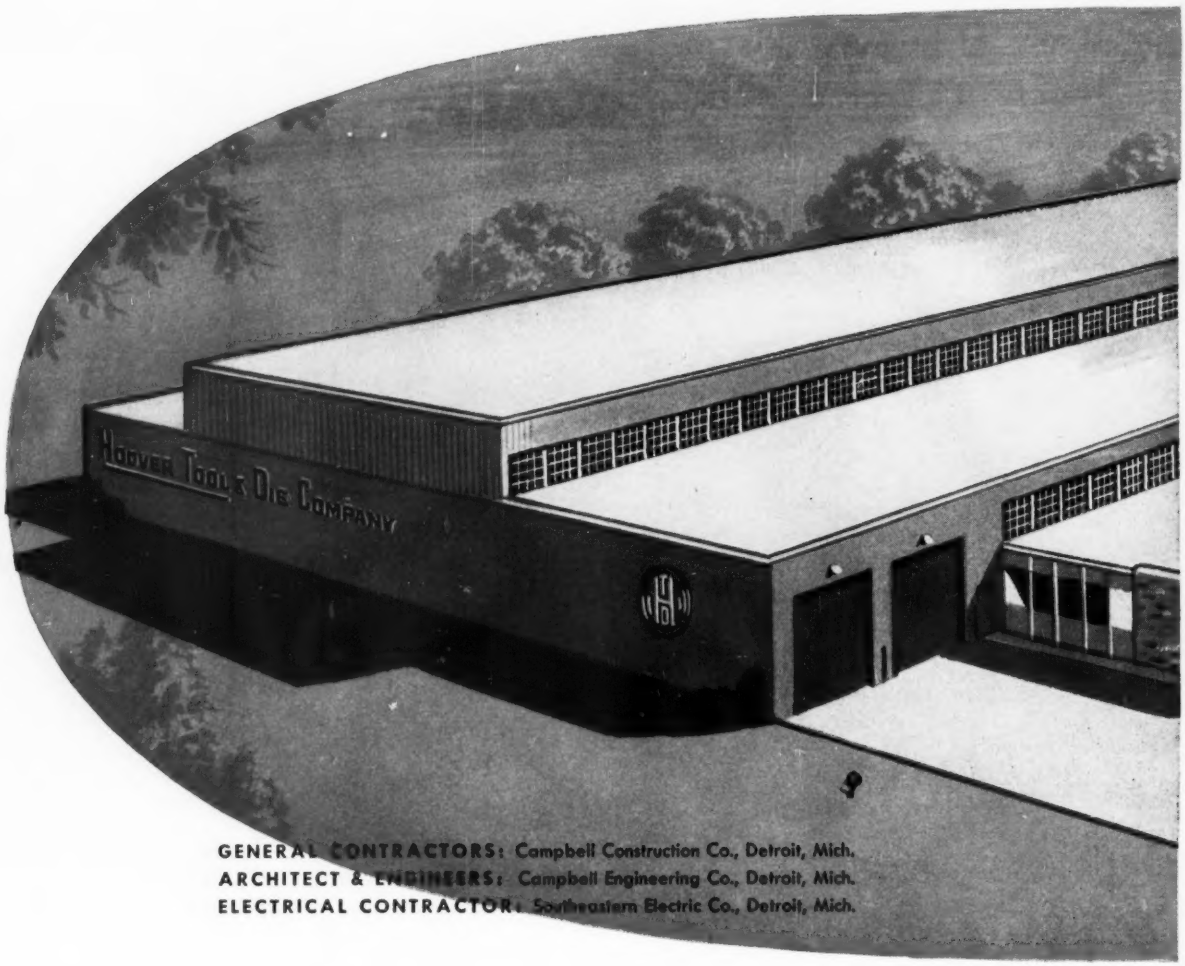
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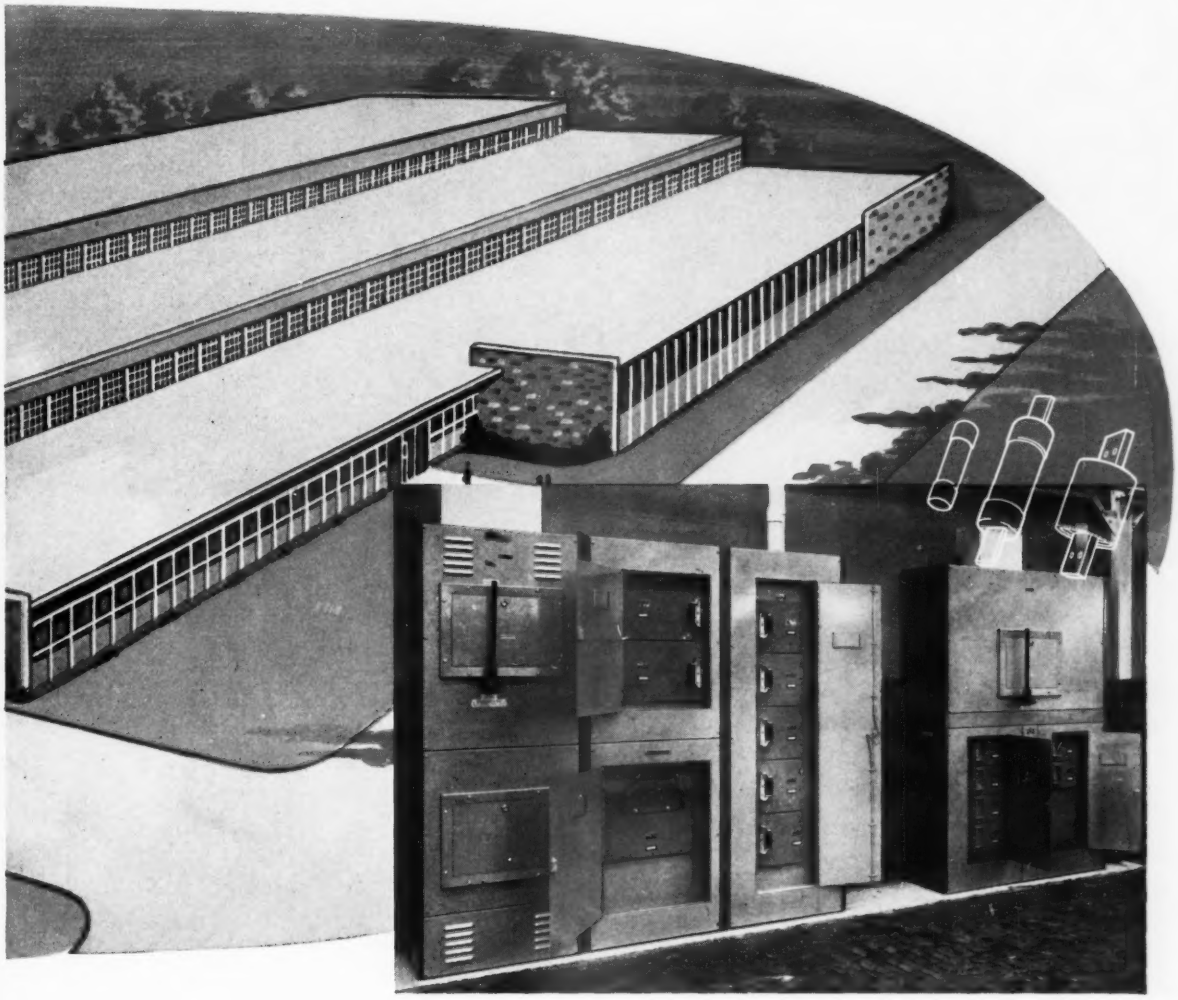
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The dependability of BUSS Hi-Cap and FUSETRON fuses helps to reduce costs — by preventing damage and loss due to electrical faults — by being maintenance free — by requiring no periodic inspections — and by eliminating shutdowns caused by needless outages.

Is it any wonder then that "ELECTRICAL PROTECTION IS GOING MODERN WITH FUSES"? No other type of protective device can match the combined high-interrupting capacity, dependability and maintenance-free features of fuses.

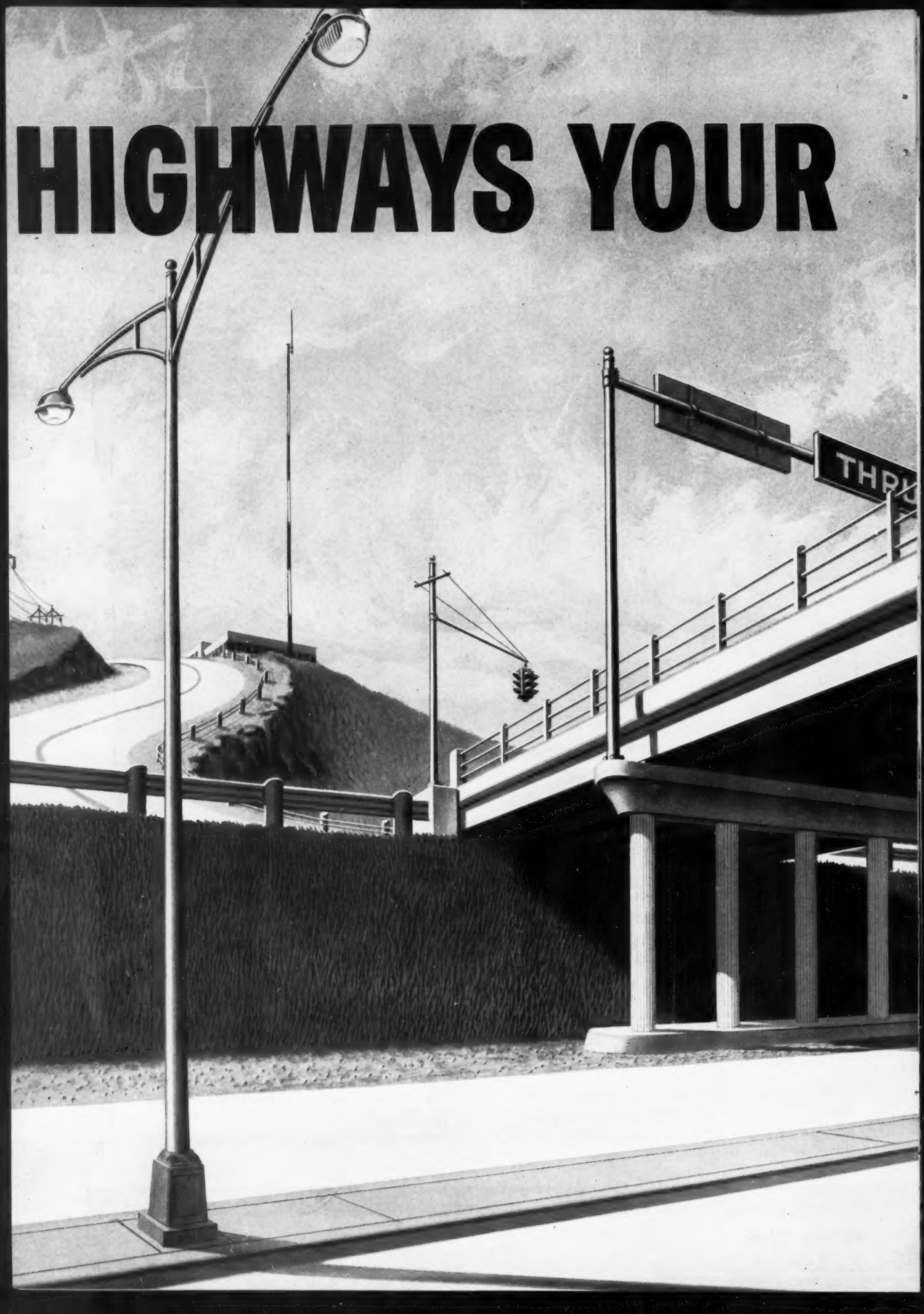
For more information

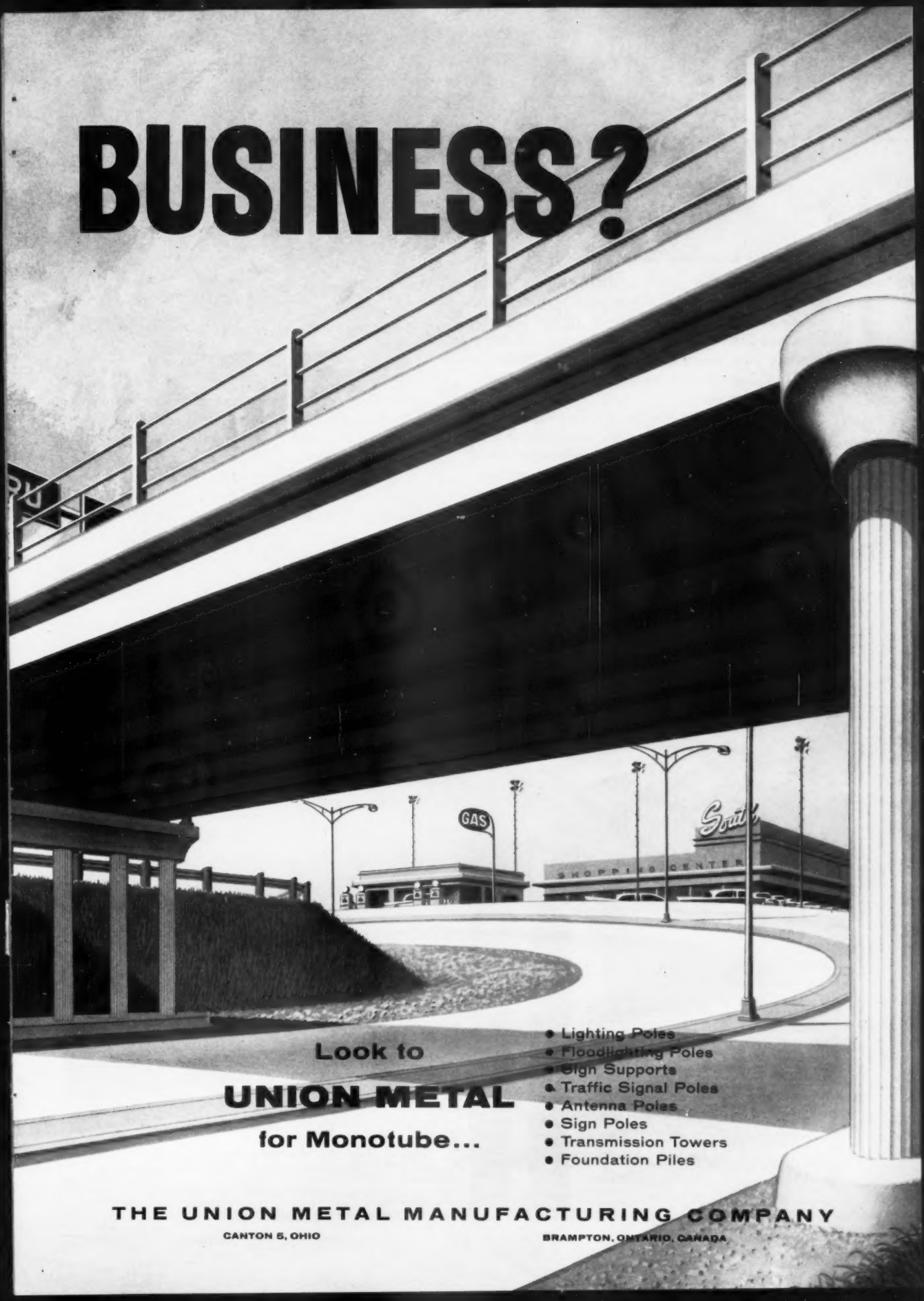
On BUSS Hi-Cap fuses . . . . *Write for bulletin HCS*

On FUSETRON dual-element fuses . . . . *Write for bulletin FIS*

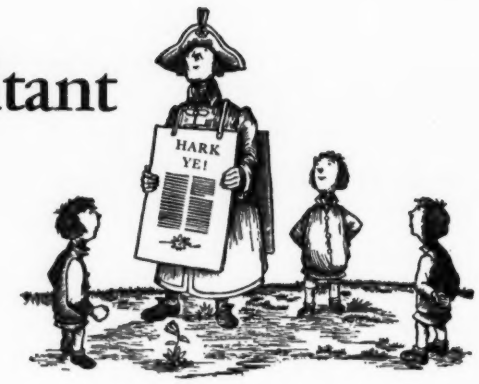
759

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News for the Consultant



Professional Engineers' Income

Median incomes in excess of $10,000 were found only in consulting firms, industry, and construction contractor firms according to the 1958 NSPE *Income and Salary Survey*. Industry and consulting firms ran in a barely distinguishable two-three order. These figures combine both employee and self-employed incomes.

Looking at the figures for employees only, the consulting firm's personnel does not fare quite so well. In fact, the median for employees of the Federal government is considerably higher on a nationwide basis. Industry and the construction contractor firms offer the greatest rewards for employees.

On the other hand, the ambitious young engineer would do well to study the NSPE report rather carefully before deciding against the consulting field. When figures for the top 10 percent of the income groups in all fields of engineering employment are analyzed, consulting engineers run a close second to the construction contractor and are far ahead of the industrial group.

In general, regional differences in engineering salaries are tending to level off. However, it is interesting to note that the New England area, with its concentration of large consulting firms around Boston, still offers a significant income bonus to both employees and owners in the consulting field. Median income for self-employed consultants in this area is $15,230, for employees $9750.

The complete report is available from NSPE headquarters, 2029 K Street, N.W., Washington 6, D.C., at $1.00 to members, $2.00 to nonmembers.

Network Analyzer for Rent

New I-T-E unit is one of the largest of its kind in the world. It is available to consulting engineers on a rental basis for planning the growth of power systems. Analyzer can handle all types of power system problems, including the study of load



Earl Tuttle (behind desk) consulting engineer from C. H. Guernsey uses the new I-T-E network analyzer.



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Convenient—Saves time and space

● *1-7/16" thin, of light-weight, modern construction; when supplied with a straight edge and carrying case, becomes a self-contained, versatile drafting unit for desk or field.*

Light weight and thin design encourage use on regular drafting board, permit unit to be stored with reference books, ready for next user. It pays for itself in a short time.

- in addition to tracing applications, may be used to study interference and motion in superimposed layouts, to check detail drawings, or to trace on Multilith mats and strip in and opaque negatives. Also used to display or examine transparencies and x-rays
- PORTA-TRACE fits under parallel rule on drafting board or may be supplied with locking T-Square, other attachments. Can be used with drawings larger than unit
- cool fluorescent lighting; stainless steel frame; shatter-proof diffuser top; built-in switch; rubber feet—available in 5 sizes up to 36" x 48", starting at $32.50

Write today for complete information and prices!

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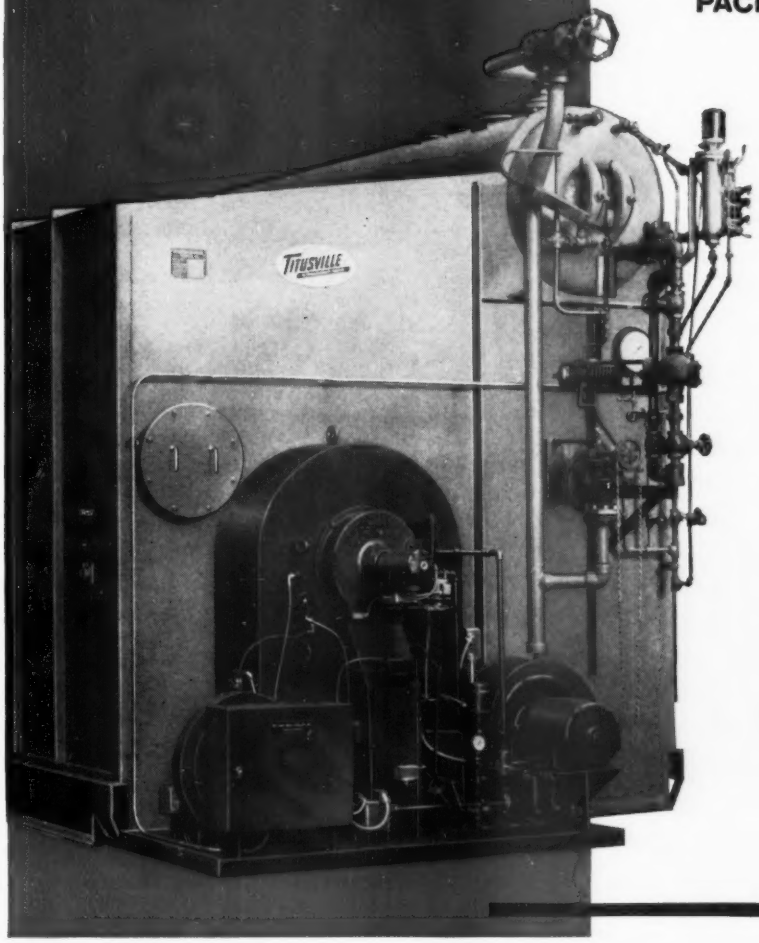
READY FOR SERVICE

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Versatile and efficient in operation

TITUSVILLE TYPE WTP

PACKAGE STEAM GENERATOR



This is the modern water-tube steam generator that is *packaged to serve you better*—easy to transport due to compact size, ready to operate soon as service-connected, and adapted for firing with heavy oil; combination heavy oil and gas; light oil; combination light oil and gas; natural gas; manufactured gas; and coke oven gas. The Titusville Type WTP requires no high stack or induced draft fan, is ruggedly automatic-welded throughout, meets latest ASME code requirements, and offers wide choice of full or semi-automatic control arrangements. Let a TITUSVILLE Engineer discuss your steam generator needs, soon!



Write for your copy of the latest Type WTP Steam Generator folder, plus complete specification data.

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BOILER DIVISION: BOILERS for Power and Heat . . . High and Low Pressure . . . Water Tube . . . Fire Tube . . . Package Units. **PROCESSING EQUIPMENT DIVISION:** Crystallizers . . . Direct Fired Heaters . . . Evaporators . . . Heat Exchangers . . . Mixing and Blending Units . . . Quick Opening Doors . . . Special Carbon and Alloy Processing Vessels . . . Synthesis Converters. **FORGE DIVISION:** Crankshafts . . . Pressure Vessels . . . Hydraulic Cylinders . . . Shafting . . . Straightening and Back-up Rolls

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flow, short circuit effects, and transient or steady state stability, with a great saving in manpower.

The unique removable patchboard system used with this analyzer is said to cut load and fault study time by one third. Two teams can work simultaneously, with one running a problem through the analyzer and the other preparing an alternate board for the next study. Programs can be stored, changed rapidly, and constantly checked for error.

Building Code for Wood

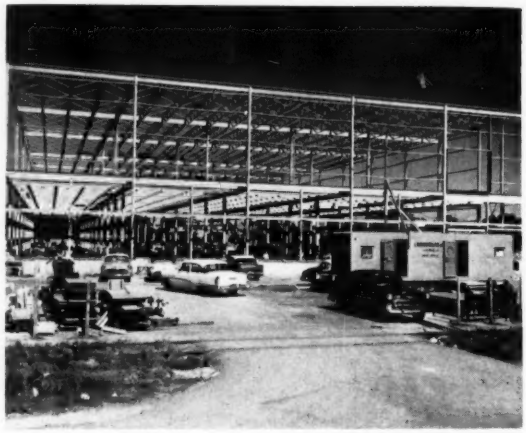
A report from the Forest Products Laboratory has been sent to the American Standards Association and distributed to members of its Construction Standards Board. Called "Recommended Building Code Requirements for Wood or Wood-Base Materials," the report is expected to be the basis for a new ASA code after thorough documentation. It is presently available for general distribution.

River Project Affects Railroad

A 1491-ft long barrage across the River Jumna at Wazirabad, Delhi controls water flow to prevent its escape by changing course during monsoons. Completed in July, the barrage will boost the water supply of Delhi from 60 to 90 million gpd. However, with the steady silting of the river, the Department of Railways now is forced to raise the level of the present bridge spanning the river to provide a greater margin of safety for the roadbed during monsoon floods.

Unusual Warehouse Design

A restricted plot necessitated a two-story warehouse with unusual ceiling heights, heavy floor loading, a 360-ft overhead conveyor bridge across existing traffic, and a railroad siding that had to be designed within the building itself. The structure was designed by Buchart Engineering Corporation, of York, Pennsylvania, for the Masell Mfg. Company.



Unusual warehouse design requires two-story construction and inside rail siding because of land shortage.

Final design was selected after making careful studies of five structural systems; two in concrete, and three in steel. The roof system selected was a long span joist design with metal deck supported by steel girders and columns. The floor system selected was concrete structural slab design supported on a steel framework.

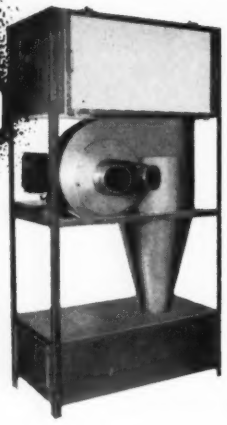
Rental Office Building for Omaha

A multimillion dollar integrated development for the City of Omaha was announced jointly by Peter Kiewit, Charles W. Durham, and Morris E. Jacobs. The group of buildings will be located on a one-block site, and construction on a 12-story general rental office and a multilevel parking garage will begin in the near future. The three firms constructing the development will have their national headquarters in the 12-story office building and will occupy approximately half the space.

The 12-story office building will have a center core containing four automatic elevators, all major ducts for central air conditioning and heating, stairs,

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Dust Collection



Easy installation . . . efficient low-cost operation . . . simplified maintenance, make Dustkop *FIRST* among equipment to collect most all industrial dusts. There are Dustkop models to eliminate your dust problems . . . that are space saving, self-contained units; or exhaust type for rafter, ceiling or outside location. Write for descriptive literature.

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AGET MANUFACTURING COMPANY

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Engineering supervision insures Gilsulate's superior protection of underground hot pipes



From the standpoint of installation cost, thermal efficiency and service life, there is no better method of insulating and protecting underground hot pipes against corrosion, chemical and electrical attack than the use of GILSULATE.

This superiority is the direct result of extensive product research by our own engineers. It is supported by tests in leading independent laboratories and engineering colleges, plus the experience gained from years of successful use in hundreds of installations.

You Get These Engineering Extras

Because we believe good service is as important as the physical benefits of the product itself, you receive the following engineering services without extra cost:

Design Assistance. Our distributors' mechanical engineers, all of whom have had extensive experience in heating and air conditioning, will work with you in preparing underground piping plans, checking soil conditions and arranging for supervision of the installation work.

Engineering "Spec-Check". Plans and specifications for all jobs requiring 30 tons or more of GILSULATE (as well as small jobs in unusual soil conditions) must be checked by our Engineering Dept. This cost-free service prevents trouble before the job is started.

Engineer Supervision of Installations. Every GILSULATE installation is supervised by a field service representative who stays on the job until it is finished. Our field engineers' daily job data sheets are your assurance (and ours) that the job meets specifications.

Whatever type of job you have in mind—school, housing project, plant or airport—if you want maintenance-free underground hot pipe insulation at low cost, specify GILSULATE.

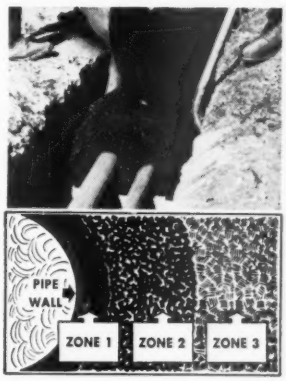
Gilsulate is easy and economical to install

1. *Needs no housing or mechanical sheaths;* no mixing, special handling or equipment. Just pour into pipe trench, shovel point it around pipes, tamp and turn on the heat.

2. *Heat fuses GILSULATE to pipes and joints* to form three zones:—Zone 1, a dense semi-plastic core to prevent corrosion, chemical and electrical attack. Zone 2, a sintered zone providing excellent thermal insulation under wet or dry conditions. Zone 3, which provides a final zone of thermal insulation and a support for Zones 1 and 2.

3. *Three Types Available:*

Type A for 220-300° F. temp. range
Type B for 300-385° F. temp. range
Type C for 385-520° F. temp. range



GILSULATE®

THE TRIPLE-ZONE INSULATION FOR LIFETIME PROTECTION OF UNDERGROUND HOT PIPES

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Distributors in Principal Countries of the World

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restrooms, closet space, and piping. According to Kiewit, the structure will be unique among major buildings in Omaha because it will be designed without any interior columns.

The development is being designed by Henningson, Durham & Richardson, engineers and architects.

Asuncion Gets Water System

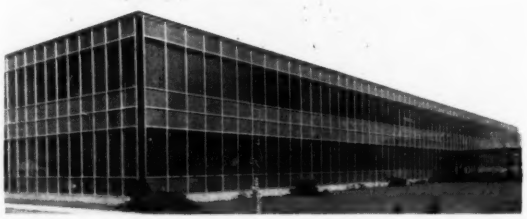
For the first time in its 432-year history, Asuncion, Paraguay is enjoying the security and convenience of pure water piped through a municipal system. Designed by Rader and Associates, Engineers and Architects of Miami, Florida, the treatment and distribution system is capable of producing 15 mgpd. Loans totaling $9 million were procured from the Export-Import Bank and Development Loan Fund on the basis of the Miami firm's preliminary reports.

Some 6000 of an eventual 20,000 home and commercial connections have been completed. Construction of the system was begun in 1956 by Kaiser Engineers International, Inc., and progressed close to schedule. Water source is the Rio Paraguay.

Unitized Panel Construction

An office building of the Turbo Products Division of Clark Bros. Co., of Olean, New York, has been constructed with 600 individual porcelain enameled panels with identical dimensions. Each panel was 2'-10¾" high by 3'-10¾" wide by ⅜" thick. Total area covered by the panels fabricated by Ingram-Richardson amounts to 6582 square feet.

Architects and engineers on the job were Laucomer and Manser, of Detroit. Panels were specified with 16-gage porcelain enameled steel face, ¾-in. aluminum honeycomb core, and 16-gage steel galvanized inner face. Vinyl tape is used on all of the edges.



Porcelain steel panels for new building are all the same size. Over 600 were used in this one building.

Waste Treatment in Ohio

According to State Health Director Ralph E. Dwork, Ohioans have purchased and built more sewage treatment units in the last 10 years than in the entire previous history of the state. The number of municipalities in the state with municipal sewage treatment facilities has considerably more than doubled. Industry, he added, has kept pace with this growth, the number of industrial plants with satisfactory waste treatment facilities more than tripling in the period.

However, he also noted the following conditions. There are 22 cities without any sewage treatment, although a dozen of them have sewage plants under construction; 81 villages urgently need sewage plants, but less than a third of these have plants under construction; there is a continuing problem of deterioration of existing municipal sewage plants; and there is a considerabe lag in providing adequate sewers even in some of the largest cities.

The state health director also pointed out that there still are 236 industries without adequate waste treatment, with 163 having partial treatment facilities and about 40 with facilities under construction.

Demolition Consultants

Sanford C. Cassell, of Daniel, Mann, Johnson & Mendenhall, engineers and architects, reports that the firm recently called on Davis Iron & Metal Inc. of Arlington, Virginia, for consultation on razing of large machinery and other equipment made of metals. The resulting report was adopted for use on

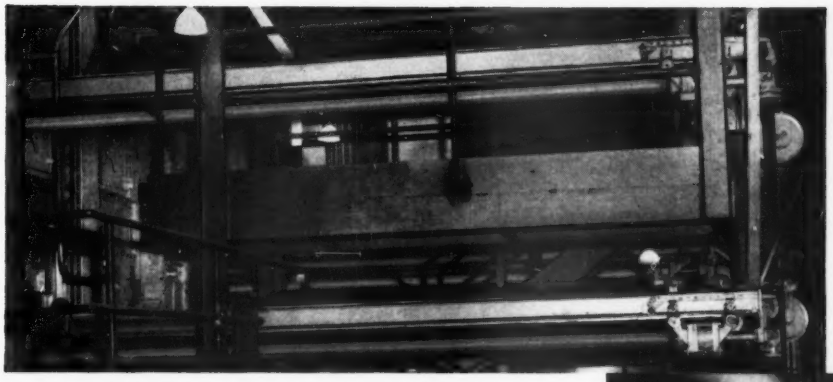


AT F.M. TAIT STATION, DAYTON POWER & LIGHT CO.

BOILER CLEANING IMPROVEMENT HELPS MODERNIZATION PROGRAM

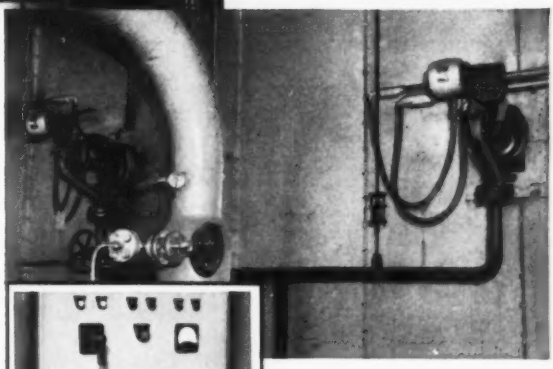
SAVE $40,000 Per Year in Operation

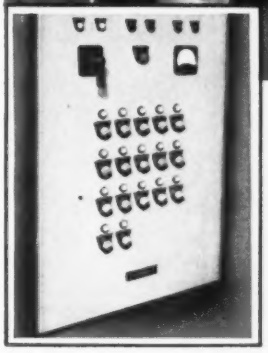
and Cut Blower Maintenance Costs



Three of the Diamond Model IK Long Retracting Blowers installed to replace manually operated rotary blowers. Electric motor driven, they are controlled by the Automatic Sequential Panel. Air is used as the blowing medium. Rotary elements were retained in cooler locations and motorized for automatic operation and are also controlled by the Automatic Sequential Panel.

Two of the air blowing Model IR short retracting wall blowers with electric automatic operation.





Diamond Automatic Sequential Control Panel installed as part of the modernization program at the F. M. Tait Station. This panel automatically operates each blower in turn until the blowing cycle is complete. Any individual blower may be operated independently by simple turning switches. Cleaning program is set up by switches. Operator starts—thenceforth operation is automatic.

DIAMOND BLOWERS and AUTOMATIC SEQUENTIAL CONTROL PANEL

In the continuous struggle to cut operating costs, the Dayton Power & Light Co. has found a very useful tool in "Boiler Cleaning Modernization."

By applying the latest soot blowing equipment to four of their boilers at the F. M. Tait Station, together with other features of the modernization program, the Dayton Power & Light Co. was able to reduce the operating costs on these boilers by some $40,000 per year and also cut blower maintenance costs.

On the first boiler that had its cleaning modernized, 17 rotating elements were removed; the remaining seven blowers of this type were electrified for automatic control. The cleaning equipment added consisted of five Long Retracting Blowers and six Short Retracting Blowers. All blowers are automatically controlled by a Diamond Selectromatic Panel.

This is one of many examples of the savings possible by improvements now available in Diamond Blowers and Automatic Sequential Control. Over the years Diamond has engaged in continuous aggressive research in boiler cleaning. This research has paid off in improvements that save you money and improve your operation.

Let us make a study of your boiler cleaning . . . perhaps similar savings can be suggested.

DIAMOND POWER SPECIALTY CORP.

LANCASTER, OHIO 8291

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a project for the U.S. Corps of Engineers. This unusual consulting service is believed to be the first of its kind in the area.

Pressure Piping Code

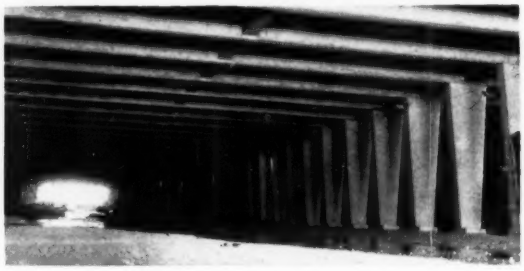
A new revision of Section 4 of American Standard Code for Pressure Piping – Oil Transportation Piping, B31.4-1959 – has been approved by the American Standards Association and published as a separate document by the American Society of Mechanical Engineers. The new code is available at $2.50 a copy from the American Standards Association, 70 East 45th Street, New York 17, New York, or from ASME.

Outside Consultants for Sacramento

The Sacramento City Planning Commission unanimously endorsed a study by outside consultants to create a detailed master plan for the solution of traffic and other problems in the central business district. Commissioner John R. Lyon asserted that a single study by qualified consultants would be preferable to the many studies contemplated or in progress by various agencies. City Planning Director Richard L. Rathfon emphasized the need for using consultants outside city service. His technical staff, he said, is not large enough to do the job, and he would hesitate to propose that his office make the study because so many factors must be considered. He said these factors should be analyzed by experts not available in public service.

Orly Airport Expansion

By 1960, Paris' Orly airport will be capable of handling the largest jets and a passenger load of over 5 million annually. The expansion program involves the construction of 11 bridges, two of them over 1000-ft wide. One of these extra-wide bridges will carry the main east-west runway over the new Autoroute du Sud, while the other – actually three bridges in one – will take the new airport terminal, its carpark and service area.



One of eleven new bridges required for expansion of Paris' Orly airport. Note unusual tapered column design.

The project required the excavation of over 1½-million cubic yards of soil to make the trench for the expressway below the airport level. The Paris Airport Authority is spending upwards of $65 million, with over $40 million scheduled for 1959.

"K System" Concrete Floors

A new system for setting concrete floors is being used in the New York metropolitan area and in Pennsylvania and Washington, D.C. Plywood sheets are laid between the structural steel beams and the ends of the boards rest on cast iron clips that are snapped to the beams every three feet. The clips which are Z-shaped are about two-inches high.

Wire mesh then is rolled over the plywood boards and the concrete is poured to a thickness of 2½ inches, forming the slab floor. When the concrete has set a workman snaps off the small ends of the clips on which the plywood boards rest, thus releasing the boards, which can be used as many as 20 times. Part of the clips remain in the concrete, anchoring the slab to the steel beam.

Commercial Solar Heat

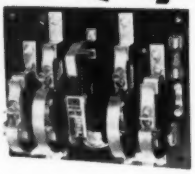
A correspondent of *The Economist* (London) has discovered an interesting and commercially impor-

ZENITH

MOST DEPENDABLE CONTACTORS IN THE INDUSTRY

For:

time switches—
motor starters—
lighting—equipment
control—all applications
requiring complete reliability and long service life.



All parts are accessible—readily inspected, easily replaced. Full floating armature permits perfect magnetic seating, silences AC hum.

Contacts are copper to copper. Heavy compression springs assure contact pressure, quick opening. Coil will not overheat in 24-hr. continuous service.

Zenith contactors are made for severe duty. Capacities to 600 amps.

Send for 64-page Engineering Reference Catalog No. E18-A.

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Less than
¼ turn
opens or closes

When you need...

- Quick action
- Leak-Proof Seal
- Minimum Pressure Drop
- Straight-through full flow
- Valves that cannot wedge or jam
- Self-grinding rotating disc

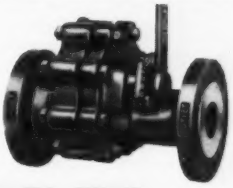
Specify Everlasting Valves

For more information **WRITE** for these bulletins.

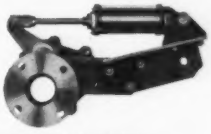




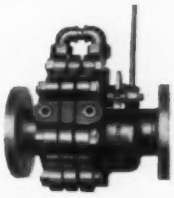
BOILER BLOW-OFF
Quick acting, also handwheel operated "Y" and angle types. For pressures up to 600 psi.



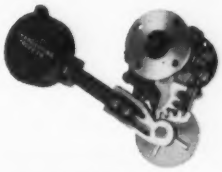
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Where drop-tight seal and full flow is essential.



CYLINDER OPERATED
Can be remotely controlled, electrically or manually.



STEAM JACKETED
Assures free flow of viscous materials.



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For automatic drains or emergency shut off.

Everlasting VALVES

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EV 408

Distinctive Lighting at Modest Cost



tant solar heat application in France. Professor Felix Trombe of the Sorbonne is in charge of the plant which is located at Mont-Louis.

Professor Trombe started 10 years ago with a few German army searchlight reflectors contributed to him by the French government. His experimental work with these make-shift reflectors was so convincing that the French government came through with the money needed for a full size project. Currently, Professor Trombe has two 12-ton mirrors, one flat and one parabolic. The flat mirror reflects the sun's rays onto the parabolic mirror which then focuses on an unusual oven. This oven is a revolving, water-cooled crucible, with a normal working temperature above 2700 C.

This revolving crucible has been used not only in metallurgical experiments but also to turn out commercial quantities of some unusual rare metals needed for space equipment and high speed jet aircraft. At very high temperatures these rare metals have a tendency to absorb impurities from electrodes used with conventional electric furnace techniques. This revolving crucible needs no electrodes, and the centrifugal force set up by the rotation lines the crucible with the metal being heated. Pure metal can be drawn off from the center.

It is reported that Mont-Louis has supplied several tons of zirconium and other rare metals to French industry. It is particularly good at producing corundum, a crystalline alumina of extreme hardness. It has permitted development of several new compounds and also is used for treatment of uranium oxide. French scientists and engineers are enthusiastic about the prospects.

Plans are under way for a much larger installation a few miles away with a parabolic reflector 140 feet in diameter. This should be able to handle larger commercial quantities.

Pittsburgh Civic Auditorium

Concreting of the concrete ring girder supporting the retractable stainless steel dome for Pittsburgh's new auditorium is now two-thirds complete. The girder is being poured in 20-ft wide sections, 100-ft long, with Plastiment concrete specified by the engineers to prevent construction interruption during excessively hot weather. Concrete specifications call for 2500-psi strength before stripping, which is usually reached in three or four days.



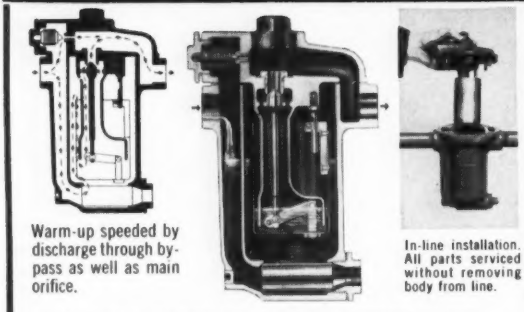
Concreting will support six stainless steel leaves of 415-ft diameter ring for the Pittsburgh auditorium.

The architect for the auditorium is Mitchell & Ritchey of Pittsburgh, and the consulting engineer for the substructure is R. A. Zern, also of Pittsburgh. Consulting engineer for the roof and superstructure is Ammann & Whitney of New York.

Structural Safety for Schools

In spite of an engineer's report that walls need strengthening at 40 percent of 53 schools inspected, the Houston City School Board declined to initiate a private inspection program. Responsibility for the inspection of school construction will be left in the hands of the project architect. However, provision was made to increase the architect's fee so that he can hire structural engineers. The board

Now—A Steam Trap that Adjusts Automatically to Every Operating Condition!



Warm-up speeded by discharge through by-pass as well as main orifice.

In-line installation. All parts serviced without removing body from line.

AUTOMATICALLY REGULATES FOR FASTER WARM-UP AND TO KEEP OPERATING TEMPERATURE AT PEAK HEAT

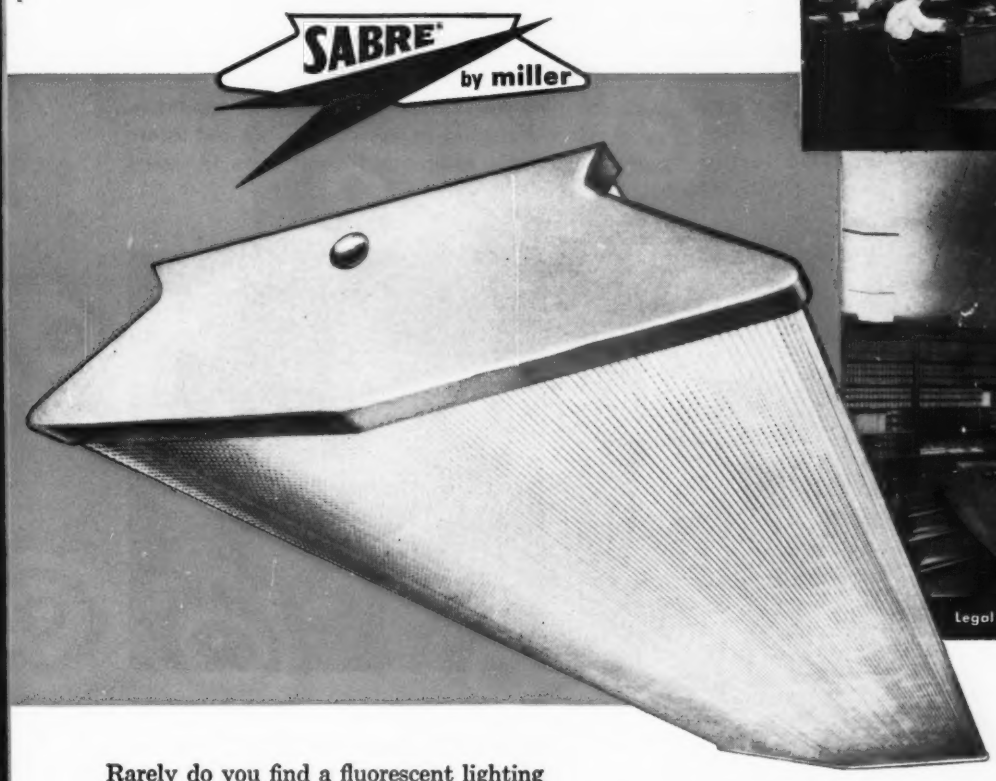
Proven bucket design with built-in accessories. By-pass thermostat increases discharge for warm-up and overload conditions. Thermostat compensated to operate at 10° below saturated steam temp. Wright-Austin Airxpel principle provides for mechanical discharge of air after Thermostatic by-pass has closed.

WRITE FOR BULLETIN 808

WRIGHT-AUSTIN COMPANY

3245 WIGHT STREET • DETROIT 7, MICH.

Distinctive Lighting at Modest Cost . . . for Interiors of All Types




General Office Area


Legal Conference Room


Dental Office


Furniture Store

Restaurant-Luncheonette



Rarely do you find a fluorescent lighting fixture that is *truly* distinctive. Occasionally, some measure of distinction is reached through appearance, lighting performance, or decorative effect produced. SABRE by Miller, however, achieves *true distinction* through a unique blend of *all* these virtues. And, it's available at modest cost.

SABRE is rapidly becoming one of the most wanted fluorescent fixtures in America. Pictured are just a few typical interiors where it is already doing a superlative lighting job. SABRE fits interiors of all types — large or small, new or old.

Styling with trim, crisp lines produces a sweeping effect and enhances decor . . . efficiency of 74½% means fewer fixtures needed per footcandle to make today's high lighting levels possible . . . one-piece, wrap-around refractor of prismatic, crystal clear plastic provides sparkle, with comfortable viewing from all angles.

For a lighted demonstration, contact your Miller representative. And, for full catalog information on this unique fixture write Dept. 8959.

THE miller COMPANY • MERIDEN • CONN.

LIGHTING BY
miller
SINCE 1844
eye-fi

* Reg. Trade Mark

called for personal reports to be made by the inspectors before any progress payments are allowed.

Modular Building Panels

The Moscow Building Industry Designs Institute has developed a building panel which they claim can be used to erect a five-story house with 85 apartments in only one month by a crew of six men. The panels, mostly of equal room size, are designed so that cross walls act as load bearing members without the use of projecting parts or apertures.

New Pile Sinking Method

A British firm has developed a pile sinking method based on the brace and bit principle. An auger type tool 4½ feet in diameter drills holes up to 80-ft deep in earth. The holes then are plugged with concrete. Two machines, each with four man crews, dug foundation shafts for a 13-story office block in a half a day. Conventional British methods would have required 40 men working for five days.

Interstate Highway Program

Uncertainty with regard to future Federal apportionments, along with the situation brought about by the 1960 Commerce Appropriations Act, has led highway departments in 25 states to suspend all contract lettings. Current debate in the Ways and Means Committee is centered around the question of a four-year or six-year stretchout period. In terms of 1960, this would mean a level of $2.2 billion for the year as compared to $600 million.

School-Wide Air Conditioning

Tulane University soon will start its air conditioning system designed to serve all present and future buildings on the campus at New Orleans. Designed



Foamglass insulated pipe for central refrigeration line being lowered into open trench on Tulane campus.

by Leo S. Weil & Walter B. Moses, consulting engineers, of New Orleans, the central refrigeration plant system was selected because of the high labor costs involved in operating individual systems for each building. According to Weil, the central air conditioning system will eventually save the University some $60,000 a year in labor costs, as compared to the manpower that would be needed to operate and maintain equipment in each building in the ultimate program.

The initial air conditioning program will include 15 buildings, all served from the central plant. Five miles of chilled water lines vary in size from 2-in. I.D. to 6-in. O.D. All pipes in chilled water systems are standard weight steel wrapped pipes, coated with three alternating layers of 1/16-in. enamel and glass cloth. Foamglas was applied directly over this coated pipe to prevent excessive heat gain in the underground lines.

Shen-Ao No. 2

Gibbs & Hill Inc. has begun work on the 125,000 kw Unit No. 2 for the Shen-Ao steam-electric generating station of the Taiwan Power Company.



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THE Pick-Nicollet

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That's what you *get* (not just expect to get) with the Clarage Type AF Dynafoil Fan...perfected for mechanical draft and heavy-duty applications such as industrial processes, conduit type air conditioning, tunnel ventilation.

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Clarage Fan Company
Kalamazoo, Michigan

Please send me Catalog 859 describing Clarage Dynafoil Fans.

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Firm_____

Address_____

City_____ State_____

The project is being built under the auspices of the International Cooperation Administration and the Nationalist Chinese Government.

An indoor installation, the second turbine generator is to be supplied by a 970,000-lb per hr boiler designed for pulverized coal and oil firing. The project also includes necessary auxiliaries, coal-handling facilities, coal dryers, and an addition to the outdoor substation of the generating plant.

Unit No. 1, also engineered by Gibbs & Hill, now is under construction, with operation to begin early next year. It has a 75,000-kw turbine generator.

British Nuclear Power Stations

Britain's heavy emphasis on large-scale gas cooled nuclear power plants continues, with completion of the 275-Mw Berkeley station scheduled for 1960. One of the two huge reactors will be completed in mid-summer, with the other to be finished by the end of the year. Consulting engineers for the project are W. S. Atkins and Partners, of London.

The construction job centers on the housing and shielding of the reactors, with an enormous amount of earthmoving required. Site work included raising the 94-acre area an average of 10 feet, with material from excavations plus 250,000 tons of hard fill.

Reactors are surrounded by a reinforced concrete retaining wall 33-ft high, forming a 300-ft diameter circle. Each reactor has eight boilers, sited circumferentially at ground level behind the retaining wall. The cylindrical reactor pressure vessel is 80-ft high and 50-ft in diameter. Biological shielding consists of 8½ feet of concrete around the pressure vessel, with a 12-ft thick pile cap on top.

Work also continues on Britain's largest nuclear power station, at Hinkley Point, Somerset County. This twin reactor installation, scheduled for completion in 1962, will have a net electrical capacity of 500 Mw. Power will be generated at 13.8 kv and stepped up to 275 kv for distribution.

Electronic Surveying Trial Successful

The Maryland State Roads Commission in cooperation with the U.S. Bureau of Public Roads has completed a nine-months' test of electronic surveying. A tellurometer system was used with high-speed microwaves to measure distances between points. It was reported that accuracy was greatly improved and that productivity was doubled.



Tellurometer converts microwave travel time into conventional units of linear measure on survey.

As part of the test eight short highway traverse jobs were executed, ranging in length from 29,000 feet to 94,000 feet. Closure accuracies that ranged from 1 part in 10,000 to 1 part in 180,000 were consistently obtained.

Activity In Tokyo

The Japanese Construction Ministry is planning to invest $8.3-billion in consultation and construction projects for rapidly developing countries in Asia as part of an all-out effort to promote a program of economic cooperation. ▲▲

OVERHEAD PANELBLOC

FREE-The Full Story Of Economical Infra-Red Comfort Heating

Industrial and commercial buildings of all kinds are now being heated by economical gas-fired overhead PANELBLOCS — the unit that "Heats Like the Sun." Panelbloc offers an entirely new heating concept. Unlike traditional heating equipment that heats the air, Panelbloc heats objects and people.

Panelbloc is low in first cost, installation is economical, since no electrical connections are needed. No fans or motors are needed for these unique heaters.

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This pictures and describes the equipment, gives dimensions and technical data: operating principle.

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6050 SERIES

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Features of this practical floodlight include: wide range of focusing through unique, adjustable dial mechanism; a free swinging cast aluminum cover ring and heat-resistant lens assembly for quick lamp changing and maintenance; weather-tight construction; horizontal and vertical degree adjustment; lead-in wiring furnished with water-tite cord gland. Optional use of 300 or 500 watt incandescent Mogul base lamps or mercury vapor lamps. Wide variety of accessories for pole and wall mounting.


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For Railroad Yards


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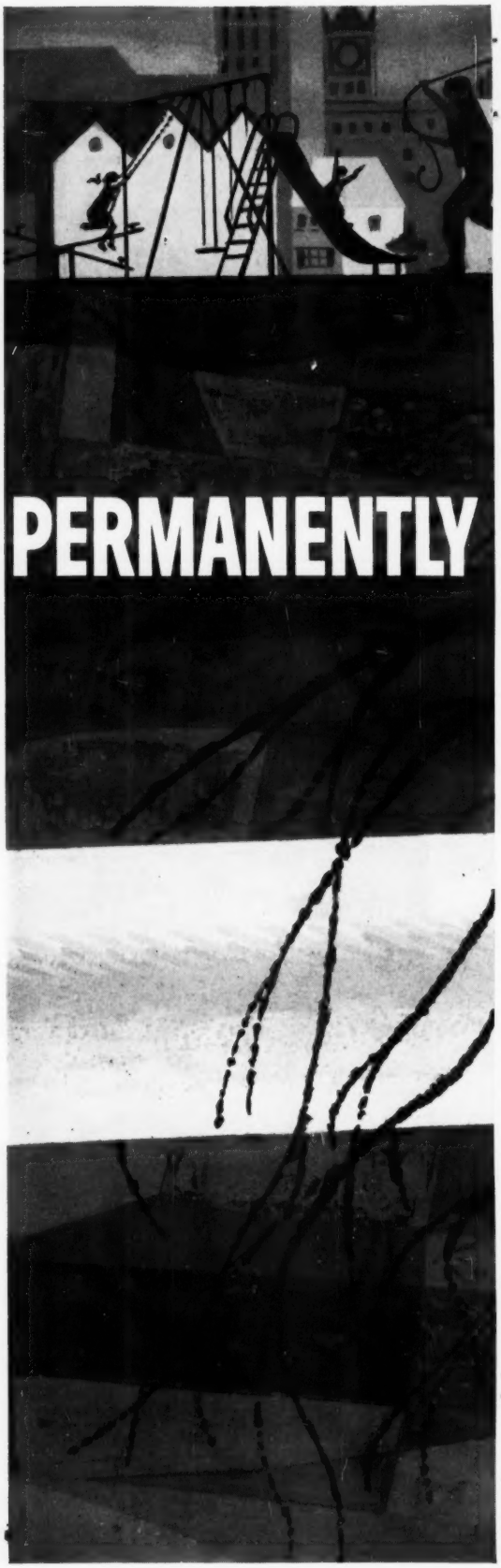

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Industrial Lighting Equipment




Automatic Reelites

K&M ASBESTOS-CEMENT SEWER PIPE



Sewer pipe maintenance headaches disappear when you install "K&M" Asbestos-Cement Sewer Pipe.

Flow-stopping, pipe-clogging roots . . . no matter how cobwebby-thin . . . can't penetrate the exclusive patented "K&M" FLUID-TITE coupling . . . unmatched in its tight sealing. In repeated tests, "K&M" Asbestos-Cement Sewer Pipe successfully resisted infiltration even when external water pressure was 25 psi . . . the equivalent of a 58-foot head and way above field conditions.

Service remains continuous and uninterrupted . . . with fewer inspections and periodic cleanings. You can reduce treatment loads and costs . . . because infiltration is eliminated. Being made of quality asbestos fibers and portland cement, "K&M" Sewer Pipe does not corrode and is immune to electrolysis.

In fact, "K&M" Asbestos-Cement Sewer Pipe is a tax-saver at every stage of construction: planning and installation, as well as maintenance. Transportation and handling is less expensive, because "K&M" Asbestos-Cement Sewer Pipe is light in weight.

In short, practically indestructible materials plus eighty-five years of asbestos engineering give you the finest, most dependable sewer pipe available. That's why we urge you to write today for more information.

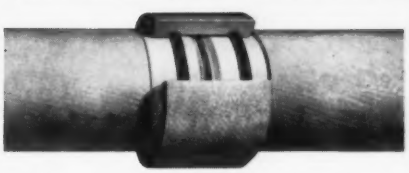
5 CRUSHING STRENGTHS OF K & M SEWER PIPE

Size Inches	Class 1500	Class 2400	Class 3300	Class 4000	Class 5000
6	1500	2400	3300		
8	1500	2400	3300		
10	1500	2400	3300	4000	5000
12	1500	2400	3300	4000	5000
14	1500	2400	3300	4000	5000
16	1500	2400	3300	4000	5000

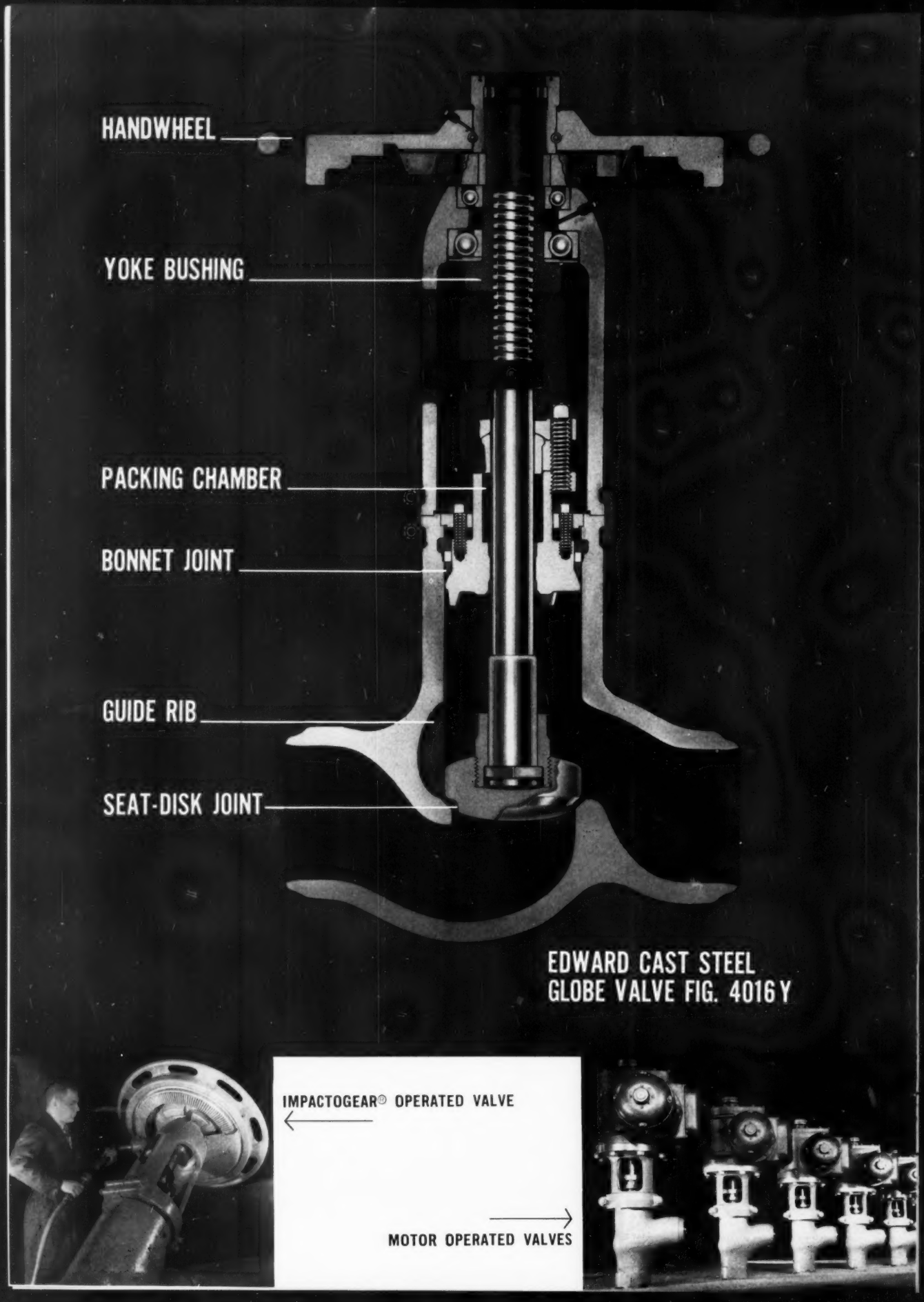
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Exclusive FLUID-TITE Coupling joins lengths of various crushing strengths and sizes. Assemble it in any weather—without the aid of heavy machinery. It's water-tight and root-tight.



EDWARD CAST STEEL
GLOBE VALVE FIG. 4016Y

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MOTOR OPERATED VALVES

What's New from Edward Valves

New Products . . . Solutions to Problems . . . Information on Steel Valves from Edward, Long-Time Pioneer in the Field!

HOW TO SELECT CAST STEEL VALVES

Valves for today's high-pressure processes require economy, dependability and safety in operation. The material on these pages is designed to help acquaint you with a few basic principles and features you should consider when selecting cast steel valves 2½ inches and larger.

VALVE FEATURES FOR LONGER LIFE, EASIER OPERATION

Valve Handwheel should be large enough to operate valve easily. On smaller valve sizes, a knobbed handwheel design permits tighter grip. But for larger, high-pressure valves, impact-type handwheels will increase closing force, insure tighter closure (see large illustration opposite page). Quick closing can be obtained with impact-type handwheels geared for closing with the aid of portable air or electric wrenches (bottom-left, opposite page). Or, where central or automatic control is desired, consider fixed motor operation (bottom-right, opposite page).

Yoke Bushing on larger valves in higher pressure classes should be equipped with double ball-bearing construction for reduced operating torque and effective transmission of closing load (large illustration on opposite page shows this design). Material is important, too. On smaller valves, bushings of bronze will help prevent stem seizing or galling. Look for ample thread engagement between bushing and yoke and between bushing and stem.

Packing Chamber should be large enough to insure long packing life. Valve packing must allow the stem to move within the bonnet but must not allow any fluid leaks between them. Well made packing, formed specifically for the packing chamber and correctly compounded for your pressure-temperature service conditions, has much to do with satisfactory valve performance. Valves with a positive backseat for re-packing while under pressure offer additional operating advantages.

Bonnet Joint of bolted construction (see Fig. 618 this page) is easiest to work with on medium or small size valves. But for lasting bonnet joint tightness, in high-temperature services (and for reduced size and weight), pressure-seal bonnet joint design is best—no flanges or bolting to periodically restress (see large illustration opposite page). Not all pressure-seal designs are alike, however. Avoid gaskets with small sealing surfaces and sharp edges that can be easily damaged and large threaded gasket loading mechanisms that are hard to disassemble and give unknown gasket compression.

Disk Guiding that properly centers the disk into the seat for positive shut-off regardless of position is important. Valve bodies with integrally cast guide ribs supporting disk throughout travel are best. Avoid designs which attempt to guide by installing spider in seat opening.

Seat-Disk Joint—An integral hard-faced seat is generally regarded as superior to screwed seat construction because it eliminates body-seat leakage and retains hardness under temperature. A hard-faced disk or disk of special alloy is desirable in high temperature services; but 13 per cent chromium stainless steel is an excellent all purpose material below 750° F.

Body Design with streamlined flow passage areas (opposite page) reduces wear-producing turbulence, decreases pressure drop and delivers maximum flow. Valves with streamlined body contours will often permit the use of smaller pipe and valve sizes. Angle valves (see Fig. 7517Y, upper right) have even less pressure drop.

For more detailed information, contact your Edward Representative, or write Edward Valves, Inc., 1210 West 145th Street, East Chicago, Indiana. Subsidiary of Rockwell Manufacturing Company. Represented in Canada by Lytle Engineering Specialties, Ltd., 360 Notre Dame Street, W., Montreal 1, Quebec.

Edward Valves builds a complete line of cast steel stop, check, non-return, stop-check and gate valves for pressures to 10,000 lbs. available with flanged or welding ends. Below are illustrated a few of the major valve designs from this complete line.



Fig. 7517Y
Angle stop valve, 1500 lb at 850 F. (3600 lb WOG), with integral Stellite seat, Stellited disk, pressure-seal bonnet, welding ends. 2½" to 14".



Fig. 618
Globe stop valve, 600 lb at 850 F. (1440 lb WOG), bolted bonnet, flanged ends, integral Stellite seat, Stellited disk. Sizes 2½" to 6".



Fig. 607Y
Angle non-return valve, 600 lb at 850 F. (1400 lb WOG), with pressure-seal bonnet, integral Stellite seat, Stellited disk-piston, welding ends, sizes 8" to 14".



Fig. 611—Gate valve, 600 lb at 850 F. (1440 lb WOG), with hard-surfaced seats and wedge, ball bearing yoke, flanged ends. Sizes 2½" to 12".



Fig. 4094Y—Horizontal check valve, 900 lb at 850 F. (2160 lb WOG), with integral Stellite seat, Stellited disk-piston, pressure-seal cover, welding ends. Sizes 2½" to 14".



Fig. 7514—Flite-Flow globe stop valve, 1500 lb at 850 F. (3600 lb WOG) or 2500 lb at 850 F. (6000 lb WOG), with extremely low pressure drop and other premium features. Sizes 10" to 18".

EDWARD STEEL VALVES
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ROCKWELL

Catalog 14 contains full data on the complete Edward line of forged and cast steel valves from ¼" to 18"; in globe and angle stop, gate, non-return, check, blow-off, stop-check, relief, hydraulic, instrument, gage and special designs; for pressures up to 10,000 lbs: with pressure-seal, bolted, union or welded bonnets, with screwed, welding or flanged ends.



Atoms in Action

JOHN F. LEE
Broughton Professor and Head
Department of Mechanical Engineering
North Carolina State College

Progress on Pathfinder Project

In May 1957, the Pathfinder project was initiated by Allis-Chalmers Manufacturing Company and Northern States Power Company, under an AEC contract, on a plant site near Big Sioux River, approximately six miles northeast of Sioux Falls, South Dakota. The purpose of the assignment is to seek a practical design of a boiling-water reactor plant – one of the hopes for economic and technically simplified nuclear power stations. Details of progress on this radically new type of power plant (see Table 1) are now available, and they should be of interest to consulting engineers.

Research, development, and construction costs of the Pathfinder project will total $9,650,000 when it is completed. The U.S. Atomic Energy Commission is contributing $6 million of this total, with Central Utilities Atomic Power Associates providing the balance. In addition, AEC has agreed to waive $1 million in fuel use charges. The power plant is expected to go critical in April 1962 and will achieve full power in the latter part of 1962.

As development of the design has progressed, some modifications of the original objectives have been made, with the current design featuring the

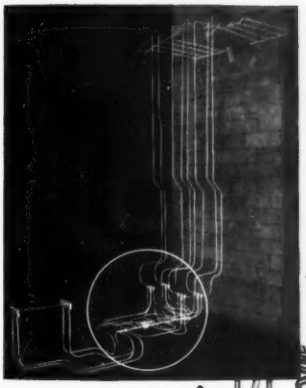
TABLE 1 — PRELIMINARY DESIGN DATA FOR PATHFINDER PLANT WITH NUCLEAR SUPERHEATER

Plant

Power, boiling region, kw	164,000
Power, superheating region, kw	39,000
Total core power, kw	203,000
Gross electrical capability, kw	66,000
Net electrical output, kw	62,000
Net efficiency, %	30.5
Steam outlet pressure, psig	540
Reactor operating pressure, psig	600
Temperature, boiling region, °F	489
Outlet temperature, superheating region, °F	825
Gross heat rate, Btu/kwh	10,370
Feedwater return temperature, °F	300-360
Steam flow, lb/hr	600,000
Condenser pressure, in. Hg abs	1.5

Reactor

Plant containment shell size	50′ x 115′
Reactor vessel size	11′ x 26′ x 3″
Material, A 212, Grade B	2¾″
Lining, 304L stainless	¼″
Total core dimensions	6′ x 6′
Dimensions of superheating region	6′ x 30″
Fuel, boiling region (Al clad), enriched UO_2	1.7%
Superheating region (S.S. clad), enriched UO_2	20% or more
Loading, boiling region, kg (U^{235})	100
Loading, superheating region, kg (U^{235})	24
Fuel, boiling:	
Number of boiling assemblies	96
Number of rods per assembly	81
Rod diameter, stepped	0.336″ to 0.418″
Box size, square	5.218″
Fuel, superheating:	
Number of superheating assemblies	429
Number of tubes per assembly	2
Outer tube, O.D. and thickness	0.726″ and 0.027″
Inner tube, O.D. and thickness	0.512″ and 0.027″



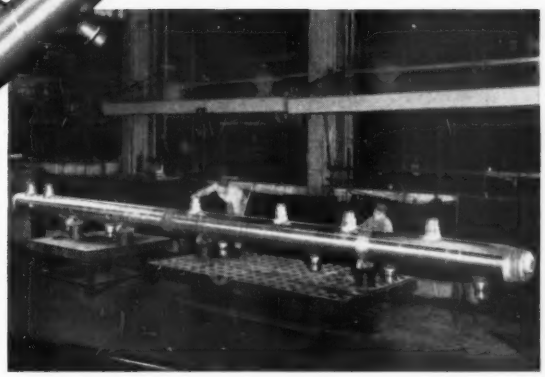
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16,500 lb. Stainless Steel Main Steam Header

PART OF A COMPLETE PIPING SYSTEM



Stress analysis of a model of power piping is an established procedure at Pittsburgh Piping. It is used to predict accurately the physical reactions of high-temperature, high-pressure piping in service.

The photograph at top left shows a model of main steam piping which is part of a complete system shop fabricated and field erected by Pittsburgh Piping. The enlarged section of the model indicates the relative size and location of the main steam header. This header, shown in the main photo, is fabricated of Stainless Steel Type 316. It weighs 16,500 lbs. and its wall thickness is 3".

Model testing and shop fabrication are two phases of Pittsburgh Piping service which covers every aspect of a piping job—from blueprint through erection. We are specialists—thoroughly experienced in the theoretical and practical aspects, as well as in the code and insurance requirements of high-temperature, high-pressure piping.

***Promoting Progress* IN POWER AND PROCESS PIPING**

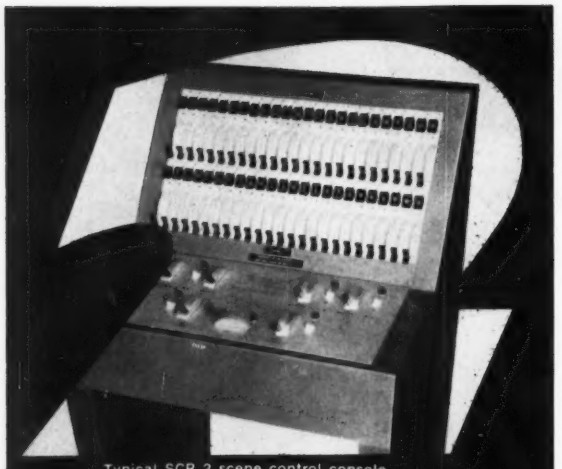
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incorporation of nuclear superheat. The normal thermal power of the reactor is 203 Mw, of which the superheater section is to produce 39 Mw. The reactor is to provide 600,000 lbs per hr of steam at 825 F and 540 psig to give a gross electric output of 66 Mw.

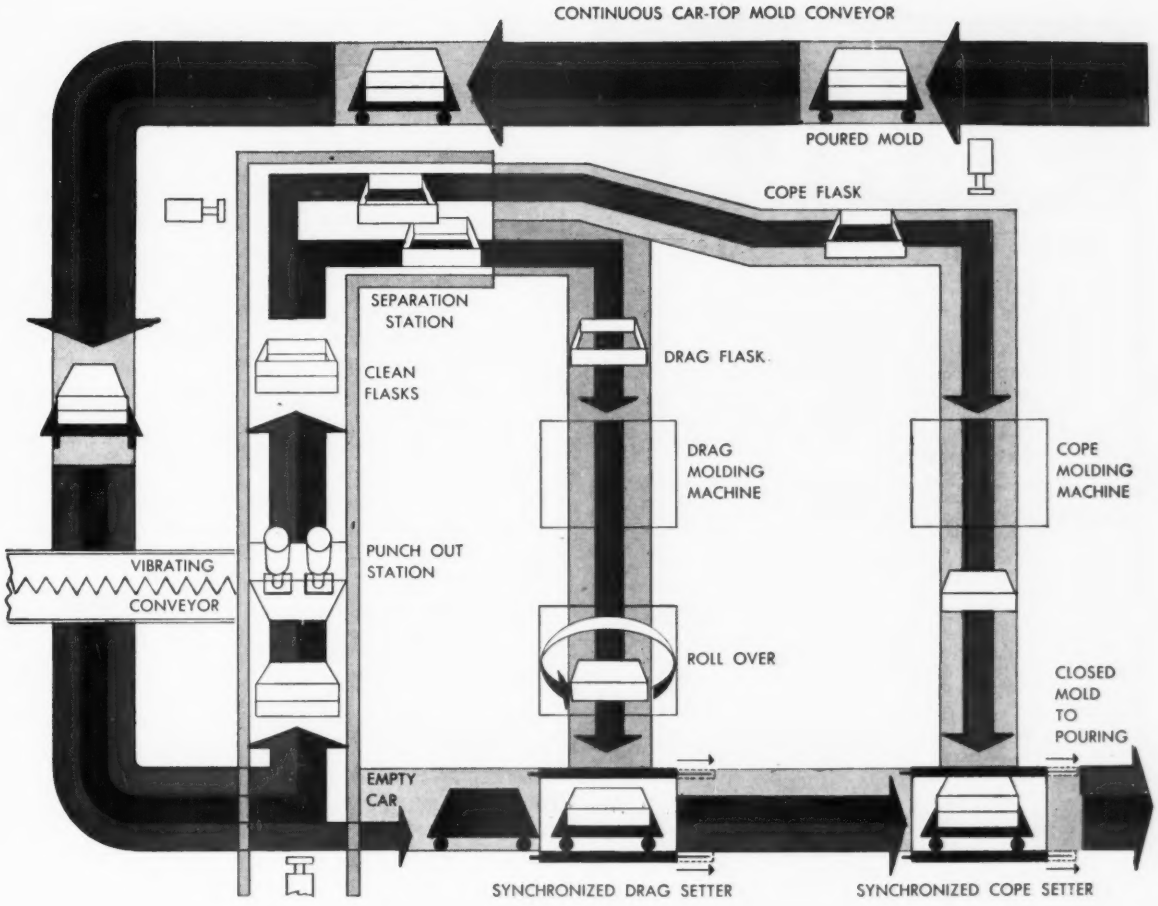
Significant Results

Since this arrangement represents the first extensive work on integral superheat for boiling reactors, the results will be significant. It is generally recognized that the outstanding advantage of the boiling reactor is its low capital cost per unit of steam rate. A major deficiency, shared by other water-cooled types, is the rather low temperature of the steam produced. It also is recognized that improvements are needed to reduce the fuel costs and the basic fuel utilization of water-cooled reactors. The use of integral nuclear super-heat represents a possible means of removing one of these deficiencies. If this can be accomplished without causing substantial increases in reactor cost and fuel cost, it should represent a major improvement in the boiling reactor. But a review of the Pathfinder work to date indicates that a number of problems still must be solved.

Core Construction

The Pathfinder reactor core consists of a boiling section and a superheating section. The superheating section is located in the center and is surrounded by the annular boiling section. Water is forced up through the boiling elements by pumps mounted in three recirculation loops connected to the pressure vessel. Steam produced in the boiling elements flows up through demister screens into the dome of the pressure vessel and enters a large downcomer connected directly to the superheating section of the core. After passing downward through the superheating section, the steam flows out of the pressure vessel through a section of insulated pipe that connects the lower end of the superheater section with a large nozzle in the bottom of the vessel.

Thermal isolation of the high-temperature superheater from the rest of the core is accomplished by mounting each superheater element in a double walled tube. The 57-mil annular gap between the double tube walls is filled with stagnant steam, which acts as a thermal barrier. These tubes are arranged in a square pattern with a center-to-center opening of 1.236 inches and occupy a cylindrical section roughly 30 inches in diameter in the center of the core. The space between the tubes is filled with light water, which serves as the moderator for the superheating region. The core is designed to avoid the formation of steam voids in this water, and the fuel-to-water ratio



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Custom designed systems, such as the automatic mold handling system shown in the above diagram, have helped build Planet Corporation's reputation throughout industry as a *versatile* organization . . . as an organization with solutions to the most perplexing production, materials handling and automation problems.

This system, installed in a large automotive foundry, automatically handles molds from start to finish. After molding, the drag and cope flasks are brought together and gently and accurately closed in position for pouring. Following pouring, the castings and sand are punched out, the clean flasks are separated and recirculated through the system . . . *a system which will pay for itself in less than one year.*

This is only one example of "PV" . . . *Planet Versatility.* Planet "PV" engineers have automated many types of production lines, built bulk and unit materials handling systems, designed complete plants, developed the world's only true universal transfer device . . . in fact, they are experts on all types of special handling and automation machinery, and materials handling equipment.

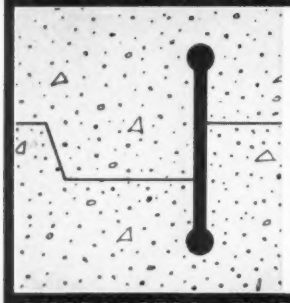
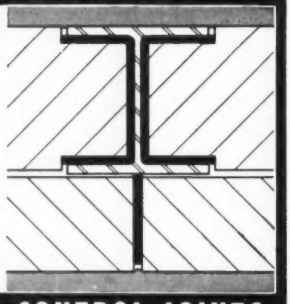
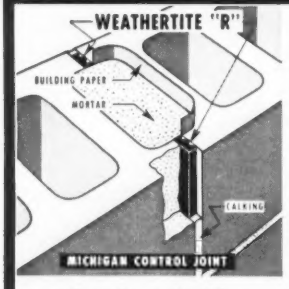
No matter what your problem . . . no matter how big or difficult your problem, "PV" will save your time in finding cost-saving, efficiency-increasing solutions. Let Planet demonstrate how its production and erection know-how can help you . . . you'll find *it pays to plan with Planet.*

PLANET CORPORATION

910

• Engineered Handling Systems
• Automation Equipment
• Mill & Foundry Handling Equipment

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RUBBER and VINYL
SEALS
FOR MASONRY JOINTS
Water Seals for cast-in-place construction joints between concrete footings and walls, walls and floor slab, wall section and wall section, and floor slab and floor slab.
Sealing Gaskets for use between sill and coping stones, brick and stone wall panels, masonry wall panels and structural steel members.
Sealing strips for control joints in block constructed walls . . . watertight seals with an inherent, permanent liveliness for use in Michigan and Besser Control Joints.
RUBBER or VINYL WATERSTOPS

Williams Waterstops are made from Natural Rubber Stock and designed for maximum effectiveness in any type of cast-in-place construction joint. They will bend around corners, and will not crack or tear from shear action. Tensile Test: 3990 lbs., Elongation Test: 650%. Available in rolls up to 80 feet in length. Field splicing is simple. Williams Waterstops can also be furnished in Vinyl or Neoprene for industrial uses where resistance to oil and other injurious wastes is desirable.
EVERLASTIC MASONRY GASKETS
Everlastic Masonry Gaskets are a readily compressible, nonabsorbent Elastomer impervious to water and inert to heat, cold and acids. In masonry joints they permit linear expansion in summer heat, and seal joints against moisture which causes frost damage in winter. Everlastic Gaskets are furnished die-cut to specifications and coated with pressure sensitive adhesive . . . they should be used between sill and coping stones, brick or stone wall panels, and masonry and structural steel members.

WEATHERTITE for CONTROL JOINTS


Weathertite is a specially shaped, nonporous, expanded Polyvinyl Chloride strip which provides multiple, continuous contact surfaces when compressed, and thereby produces the positive pressure contact essential for an effective watertight seal in standard control joints in block constructed walls. Weathertite is available in two types to meet all requirements. Type "R" is made especially for use in Michigan Control Joints; Type "RB" is made especially for use in Besser Control Joints.
See Sweet's Files, or Write for Information.
WILLIAMS
EQUIPMENT and SUPPLY CO.
456 W. Eight Mile Rd., Hazel Park, Michigan

is selected to give a minimum change in reactivity when the superheater is flooded with water.

Each superheater fuel assembly consists of two coaxial tubular elements, 36-mils thick, with an active length of 6 feet. The outer tube is 0.726-in. O.D., and the inner one is 0.512-in. O.D. Each element contains enriched UO_2 dispersed in a stainless steel matrix and is clad inside and outside with stainless steel (type 304L has been tentatively selected). Final choice of enrichment of the UO_2 has not been made but it apparently will be either 20 or 93 percent. The annular spacing of the tubes is maintained by spirally wound wire spacers, 80 mils in diameter. The two fuel elements are welded at the top to form a single assembly which is inserted into the double walled tubes making up the superheater structure.

The annular boiling section surrounding the superheater is made up of rather conventional fuel boxes containing rod type elements filled with slightly enriched UO_2 pellets. Beyond this, however, there are distinctive features. One is the use of 40-mil thick aluminum alloy for the fuel jackets. Another is the variation of fuel rod diameter along the length of the elements to help flatten the axial power distribution. Fuel rods will be 0.336-in. O.D. near the top and will be increased in steps to 0.418-in. O.D. at the bottom. For one configuration this approach gave a calculated axial peak-to-average power ratio in the boiling section of 1.21 to 1.

Material Problems

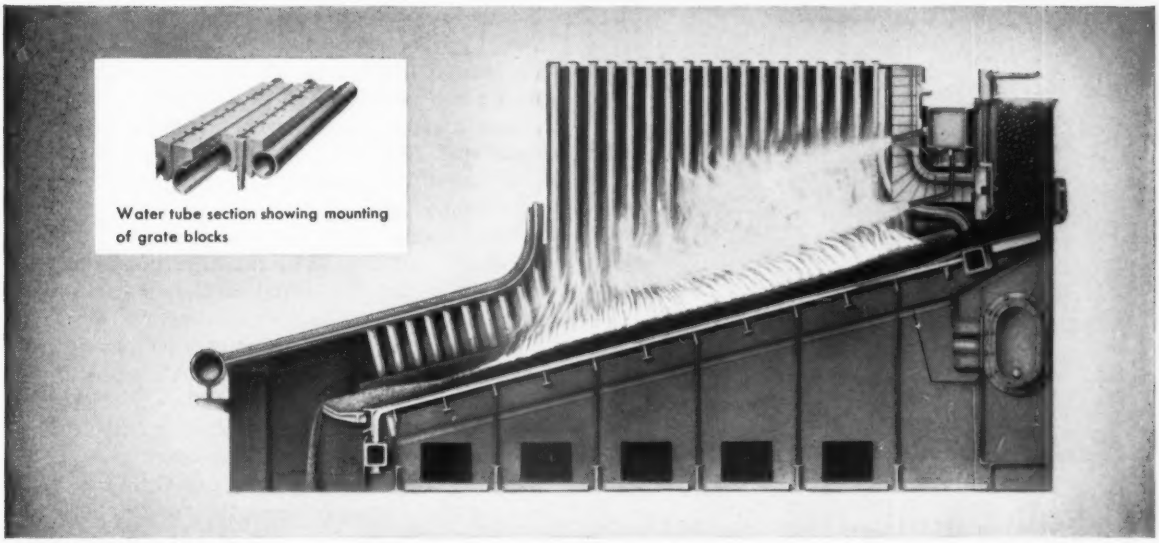
Many special aluminum alloys have been studied to find one that will be usable for the fuel jackets at the reactor pressure of 600 psig. A material is needed having both high-temperature mechanical strength to withstand the pressures developed by fission gas release plus the necessary corrosion resistance in hot water.

Composite tubes were tried in which the inner half of the tube wall was made of high strength 5083 alloy and the outer tube of corrosion-resistant X8001 alloy. Although excellent bonds were obtained in the composite tubes, maintenance of required tolerances is difficult and expensive at present. Corrosion tests on X8001 and X2219 alloys have shown a rather high sensitivity to water velocity. The limitations on velocity imposed by such characteristics may be a serious drawback in a forced-circulation reactor. The possibility that Zircaloy-2 rather than aluminum may have to be used is being considered.

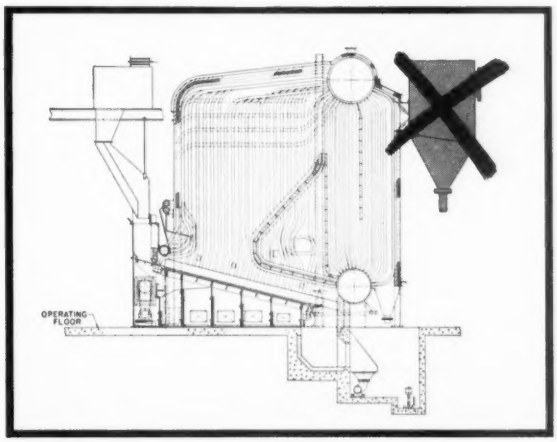
Superheating Section

Highly enriched superheating elements have been chosen for the reference design because a considerable background of proven technology exists

Only AE Vibra-Grate Stokers give you these 3 important benefits



Water-cooled grates. Water-cooling . . . directly connected to the boiler circulation system . . . guarantees the longest grate life available in any stoker today. Proven maintenance costs are less than one cent per ton of coal. In fact, one major installation has used less than $200.00 worth of repair parts in over four years of continuous operation!



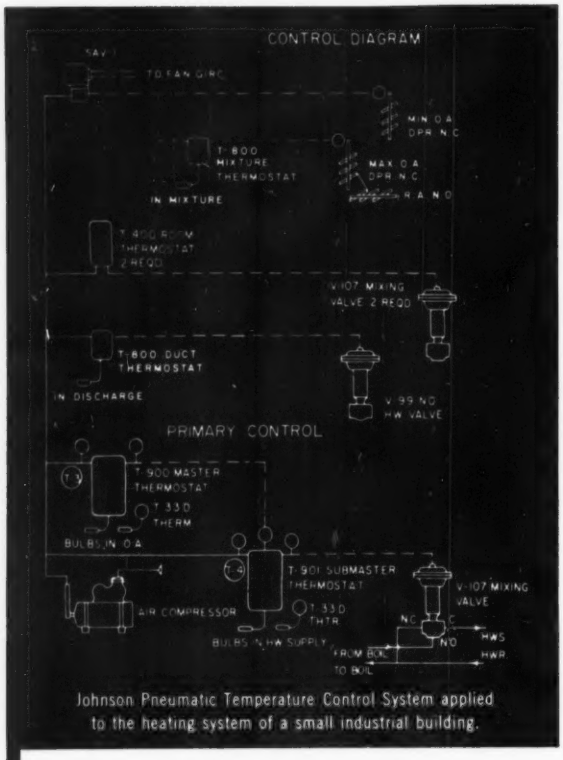
Elimination of dust collectors and cinder return systems. Vibra-Grate burns the coal on the grate . . . dust collection and cinder return systems are not needed. You will never have to be selective in the grade of coal you burn either. Vibra-Grate feeds wet or dry fuel, high or low grade coals. It can burn gas or oil singly or in combination with coal. Overfire air assures complete combustion, giving absolute freedom from smoke at high or low ratings.

Higher efficiency. Intermittent vibrating motion of the grate feeds and moves the fuel . . . insuring even, compact distribution on the bed. A combustion-controlled electric timer determines the vibration frequency as required by fuel and steam demand. There are no light spots or holes to reduce efficiency. The grate supports form air-tight zoned sections dampered to permit accurate regulation of undergrate air.

THE AE VIBRA-GRATE offers advantages in stoker operation and efficiency that have never been available before, because it is the only stoker which combines the maintenance saving features of water-cooling and the high efficiency features of a vibrating grate and controlled zone undergrate air. Only from Vibra-Grate can you get such dramatic reductions in maintenance costs . . . as well as efficiencies that can't be equaled. Write for complete information on what Vibra-Grate stokers can do for you in terms of lower operating costs. **American Engineering Company, Dept. S-111, Philadelphia 37, Pa.**

AMERICAN ENGINEERING COMPANY
Wheatsheaf Lane and Sepviva Street • Philadelphia 37, Pa.

Canadian Subsidiaries: Affiliated Engineering Corporations, Ltd., Montreal, P. Q., Bawden Industries Ltd., Toronto, Ont.



Johnson Pneumatic Temperature Control System applied to the heating system of a small industrial building.

Can pneumatic temperature control be specified for any size building?

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JOHNSON CONTROL

PNEUMATIC SYSTEMS

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for this type. The use of more economical, low-enrichment oxide elements is considered a future step that would require development. With enriched fuel in the center of the core, there is a large tendency for power to shift from the superheater section to the boiler section as burn-up progresses. Theoretically, this can be offset to some extent by using burnable poisons.

The central location of the superheater section, with its poor neutron economy, leads to rather low conversion ratios, and the use of burnable poison would further reduce neutron economy. However, the central location can be advantageous in flattening the radial power distribution. In one instance a radial peak-to-average ratio of 1.1 was calculated. The calculations also show that the flux pattern changes throughout core life, making it difficult to hold the power very flat.

The superheater is flooded with water during shutdown and at start-up, and the possibility always exists that accidental flooding might occur during operation. With the superheater in a region of high effectiveness in the core, it is essential that the fuel-to-water ratio be adjusted precisely to give a minimum change in reactivity in going from the steam-filled to the water-filled condition. For the Pathfinder core the total system change in reactivity with flooding of the superheater was estimated to be –0.7 percent k_{eff} on the basis of flooding experiments conducted at Pennsylvania State University. Variations in the flooding coefficient with burn-up have not been discussed.

Control

Superheating reactors pose unique problems in control. Both the power level and the division of power between the boiling and superheating regions must be maintained at acceptable values. The present Pathfinder design has 16 cruciform control rods in the boiling region and 4 in the superheating zone. These rods have a blade span of 10 inches and an estimated total worth of about 17 percent k_{eff}. This affords the minimum amount of control required for the core, and the use of burnable poisons is being considered to supplement the rods, especially in the superheater where large changes in reactivity occur with burn-up. Rod drives are of the rack and pinion type and are mounted on the top of the vessel.

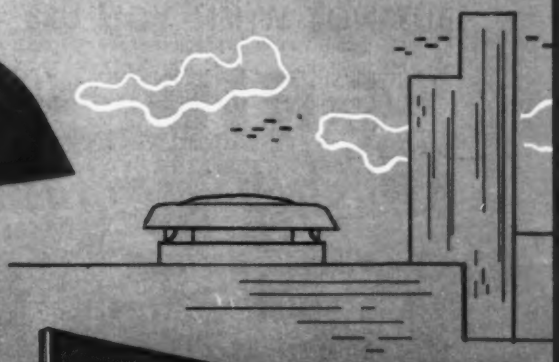
Three methods have been considered for obtaining the variable coolant flow rate that is a feature of the design: step control; variable speed drive; and throttling. None of these is completely without drawbacks. Step control, achieved by using two-speed motors on the pumps, has the obvious disadvantage of changing the flow abruptly in rather large increments. Variable speed electric drives seem to be expensive, and the amount of

VP-EX PROPELLER-TYPE

belted roof ventilator

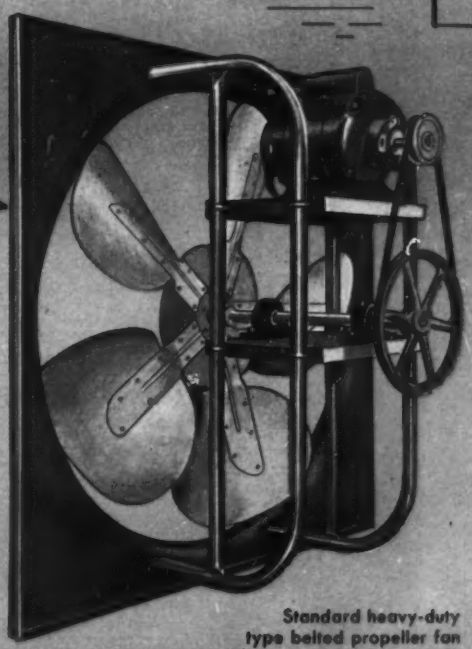


Self-contained VP-Ex belted roof ventilator



The outstanding performance of the VP-Ex Belted Roof Ventilator is derived from insistence on quality at every step—from its galvanized construction through its complete industrial-type propeller fan. This large-capacity workhorse keeps overall height at a minimum while providing efficient operation and proper clearance between air discharge and roof. Capacities from 4450 CFM to 33900 CFM; also available in smaller direct drive sizes.

Send for Bulletin 582.



Standard heavy-duty type belted propeller fan

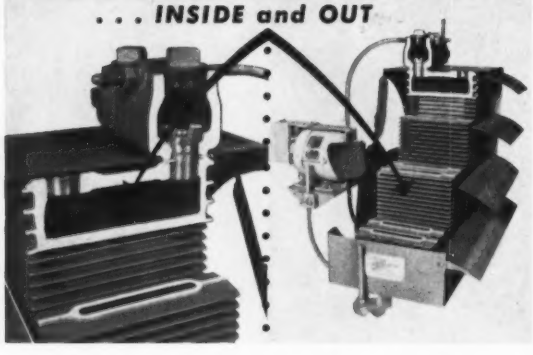
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it's the material that makes the difference . . .

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cast iron construction

- UNIT HEATERS
- BLAST HEATERS
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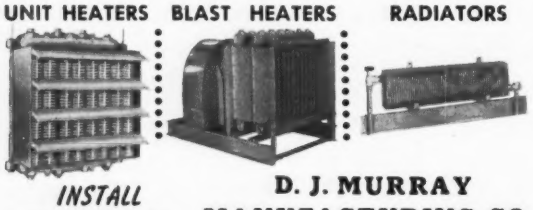
Designed for operation on steam pressure up to 250 PSI 450° temperature

CORROSION internally, caused by electrolytic action as in copper tubes, can't happen in GRID's cast iron steam chambers and headers. Nor can acid condensate corrode the bottom connections. Cast Iron, internally, resists corrosion.

CORROSION externally, caused by acid fumes cannot destroy GRID's cast iron finned heating surface. Widely spaced fins cast integral with the steam chamber will not corrode externally.

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control available from throttling valves is limited by cavitation problems.

Some difficulties also have been encountered in meeting the suction head requirements for the circulating pumps under all conditions, since in the Pathfinder design the net positive suction head (NPSH) obtained depends upon the cooling effect of adding feedwater to the saturated water from the reactor to lower the vapor pressure of the water being pumped. This was stated to be one of the chief reasons for abandoning the originally contemplated idea of mounting circulating pumps inside the pressure vessel. Internally mounted pumps required 50-ft NPSH whereas externally mounted pumps could operate with 20-ft NPSH.

Other Considerations

With an integral superheater the separation of steam and water must be accomplished within the pressure vessel. The Pathfinder design includes centrifugal separators to remove steam from the water being recirculated and demister screens to remove moisture contained in the steam. Except for the effects on pressure drop and space requirements, these devices are not serious problems.

With high-temperature steam, it is possible that decomposition gases may become a more serious problem for the turbine designer. The possibility of using a full flow catalytic recombiner in the main steam line is being studied.

Early in the project the possibility of avoiding the use of a full-sized containment shell was investigated. Although the problem is still under study, the reference design employs a 50-ft diameter cylindrical steel shell, 115-ft high.

Preliminary studies of the dynamics of the Pathfinder plant indicate that the nuclear superheater should be quite stable. With proper design of the superheater for flooding conditions, no unusual hazards are anticipated. Emergency cooling of the superheater section is somewhat more difficult than for a conventional boiling reactor, since the superheater normally is steam cooled and in the event of a scram the steam flow ceases. Calculations supported by experiment indicate that the superheater element can dissipate the heat safely through the tubes at one percent of normal operating power.

Because of the relatively low temperature of saturated steam at 600 psig, it originally was hoped that a pressure sealing gasket might be used on the pressure vessel head. Recent tests of a silicone rubber seal resulted in complete rupture of the seal at 455 psig and 475 F. The remnants were described as bloated and tacky, bearing very little resemblance to the original gasket. Although alternate materials, such as Viton A, are being studied, other methods now are being sought for achieving a reliable, quick opening vessel closure. ▲▲

A NEW ERA IN RELAY LIFE AND RELIABILITY!

A-B QUALITY

THEY MAY LOOK ALIKE, BUT

these new relays completely outmode the usual concepts of relay life and reliability.

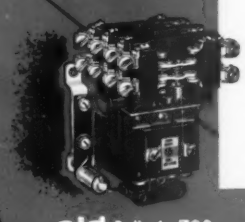
For years the Allen-Bradley Bulletin 700 Type B and Type BX relays have been preferred for their long life and their consistent, trouble free operation. In having produced millions of these relays, we learned how to improve them. Thus, the new line of Type B and Type BX relays was designed to set a new level of performance standards.

Turn the page and see the outstanding features of these new Bulletin 700 Type B and Type BX relays. For the same price, they offer you even greater value, greater reliability.

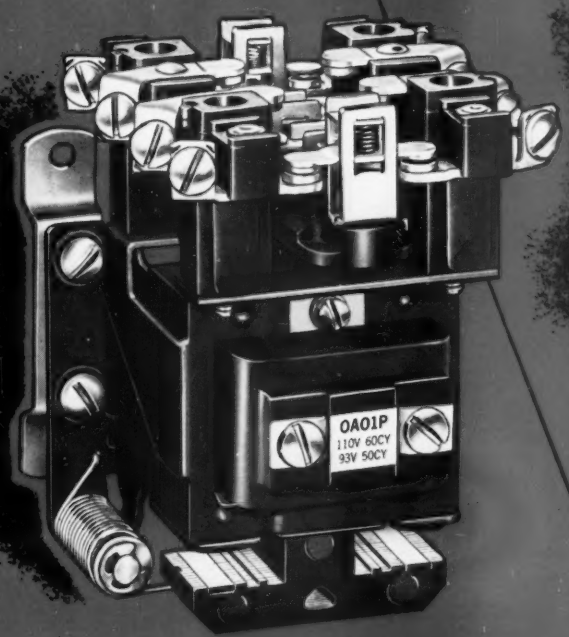
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
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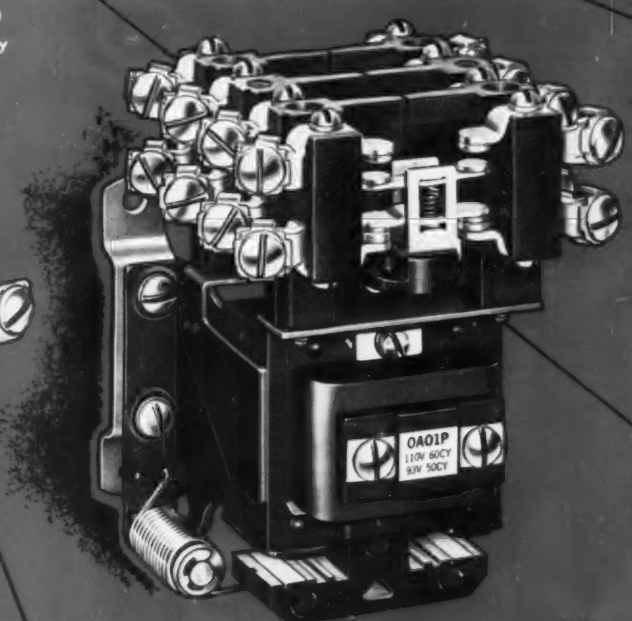
old Bulletin 700
Type B-400 Relay
with 4 N.O. contacts



old Bulletin 700
Type BX-440 Relay



new Bulletin 700, Type B-220A
AC Control Relay with 2 N.O. and 2 N.C. contacts



new Bulletin 700, Type BX-440A
AC Control Relay can be wired for normally open or normally closed contacts

ALLEN-BRADLEY
Member of NEMA
QUALITY MOTOR CONTROL

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TYPE B AND TYPE BX

provide these improved features

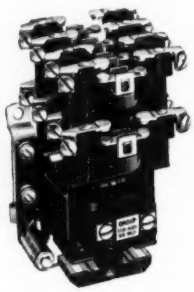
1. New mechanical design gives *at least* 5 times greater operating life.
2. New contact motion provides 10 times greater electrical reliability.
3. Compact construction—new relays are structurally improved with no change in size.
4. Complete interchangeability. Mounting dimensions of new relays have not been changed.
5. Rugged, high efficiency cast plastic coil. New, improved coil fits *all* Bulletin 700 relays.
6. New, stronger, movable contact crossbar—fits Bulletin 700 relays now in service.
7. Improved stationary contact blocks. These new blocks can also be used on present models of the Bulletin 700 relay.
8. Increased life and reliability—*no increase in cost.* These new, improved relays are priced the same as previous Allen-Bradley models.
9. The letter A is added to the Bulletin 700 relay type number merely to distinguish the new line.
10. These new relays are Allen-Bradley's "thank you" to our many customers who have bought millions of Bulletin 700 relays over the years.

A-B QUALITY

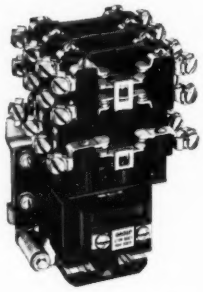
The old Bulletin 700 relay was first placed on the market some 25 years ago. Today, millions of these relays are in daily service—all over the world.

None of the old relay "values" have been lost in the new designs. Instead, these "values" have been greatly improved. The new relays feature a simplified, longer life, solenoid construction. The double break, silver alloy contacts are the same—always in perfect operating condition—without cleaning or filing. The operating coil has been greatly improved—it cannot be damaged by atmospheric conditions, no matter how severe.

No one can deny the popularity of the older Bulletin 700 relays. The new relays—with their superior features—will be an even better answer for any and all relay applications.



TYPE B, GENERAL PURPOSE
Bulletin 700, 8-pole relay. Made with 8 N. O. and no N. C., or up to 4 N. O. and 4 N. C. contacts.



TYPE BX, UNIVERSAL
Bulletin 700, 8-pole relay with both N. O. and N. C. contacts. Changeover is made by reconnecting incoming lines.



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It's new . . . and it's different. This unusual Bulletin 700 convertible contact relay has contacts that can be changed from normally open to normally closed operation (or vice versa)—in just moments. A screwdriver is all it takes to do the job—no additional parts are needed. Like all A-B relays, it's good for millions of trouble free operations. Watch for announcement and full details of this new convertible relay soon!

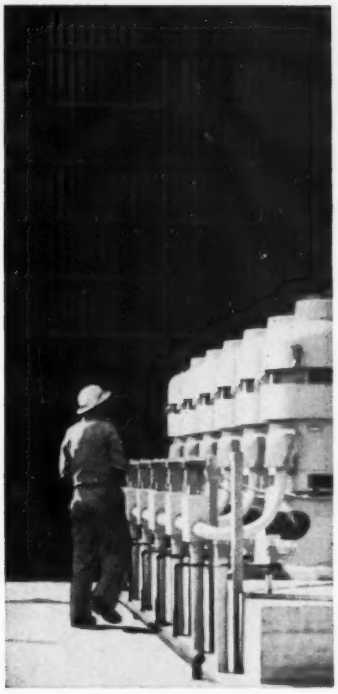
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WRITE FOR ILLUSTRATED BULLETIN NO. B-505

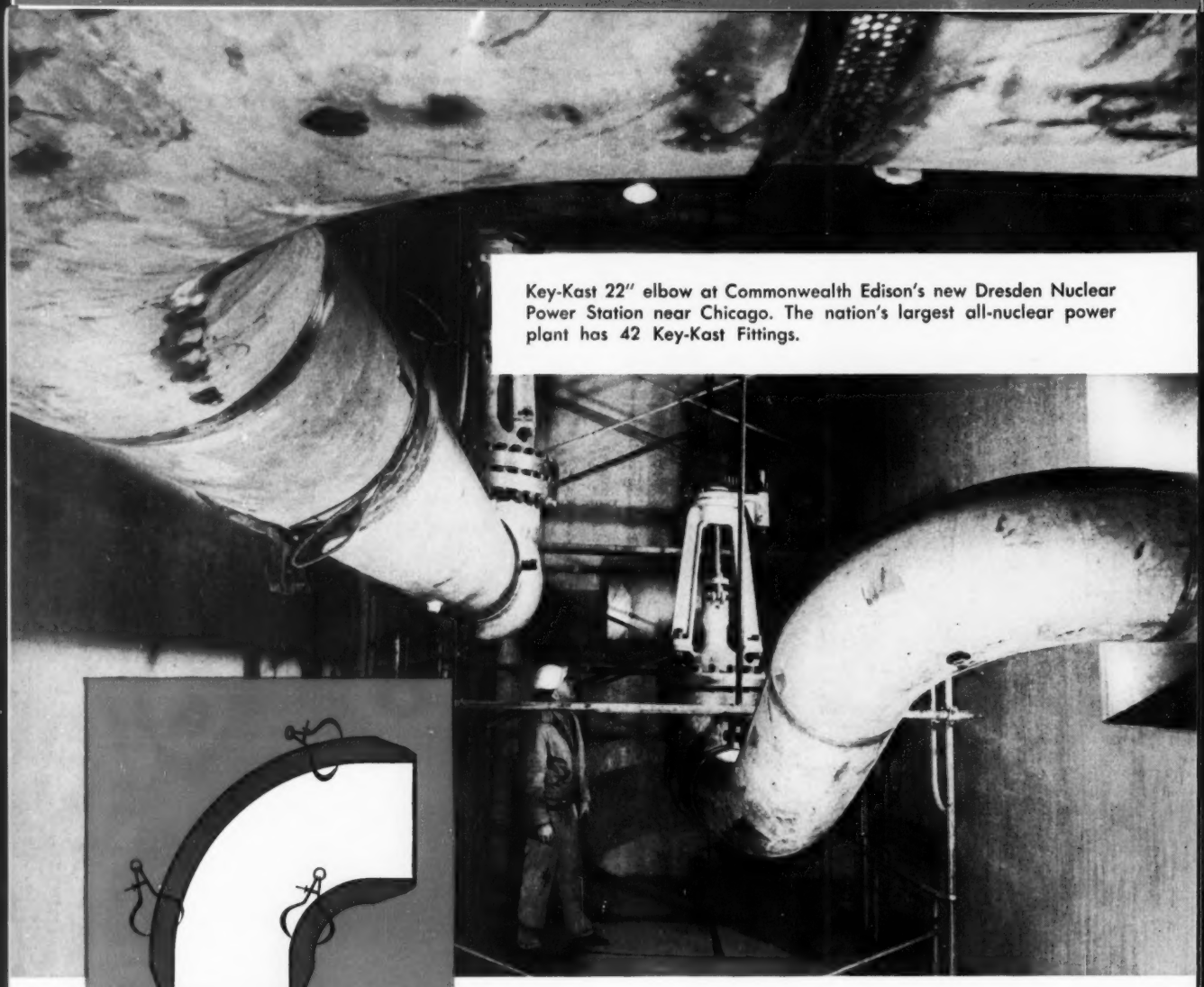
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Key-Kast 22" elbow at Commonwealth Edison's new Dresden Nuclear Power Station near Chicago. The nation's largest all-nuclear power plant has 42 Key-Kast Fittings.

Uniform Wall Elbows

Key-Kast Elbows have uniform cast steel walls approximately 15% heavier than the required minimum thickness of pipe walls of the same I.D. For extra highly stressed line sections, the wall thickness can be increased as much as desired — without sacrificing uniformity.

The flexibility of Key-Kast Elbows permits their use in piping systems based on the usual piping stress calculations. Write for engineering bulletin entitled "Key-Kast Welding Elbows in Piping Stress Calculations" and for W-K-M's Quality Control Specifications No. 103058 for nuclear power.

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Creative Engineering

KEY-KAST® elbows will carry steam at big nuclear installation

KEY-KAST *Uniform Wall* Austenitic Steel Elbows are the *first* cast welding fittings to be used in an all-nuclear power plant.

Quality controlled through the most rigid metallurgical production and testing standards, Key-Kast Fittings meet ASTM specifications, and ASME and ASA code requirements.

Call your Key-Kast representative for prompt, experienced service in selecting the Key-Kast Fittings best suited to your job. Available in all standard shapes, sizes and schedules . . . or specially designed to meet specific conditions of pressure, temperature and lading. *W-K-M Division of ACF Industries, Incorporated, P. O. Box 2117, Houston, Texas.*

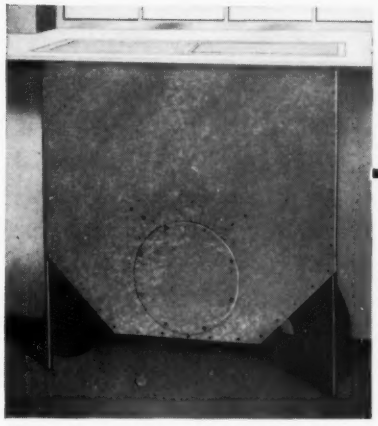
Key-Kast Fittings can handle **any** piping job. Specify them. You'll get outstanding service.

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SERVING INDUSTRY 40 YEARS

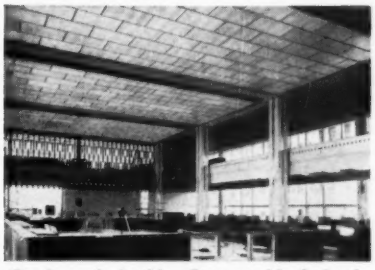
5904

at the new National Bank of Detroit main office . . .





The under-window model, with 45° inlets and top discharge air delivery, produces the same draftless air flow pattern characteristic of all Kno-Draft equipment. The air moves upward along the window and out under the ceiling, effectively conditioning an area approximately 25 feet from the outside wall. Helical spring hot and cold air dampers in each unit ensure proper air mixing . . . and full heating and cooling is achieved because dampers close with less than 2% leakage.



On the main banking floor a grid of aluminum, gold anodized, hexagonal cell lighting diffusers hangs approximately 20" below the ceiling proper, hiding ceiling-mounted lighting channels. Ducts running through a piping space above the ceiling introduce air through Kno-Draft adjustable ceiling air diffusers, all of which enable easy adjustment of air pattern,

KNO-DRAFT air diffusers and high velocity valve attenuators provide constant comfort conditions

At the beautiful new headquarters of National Bank of Detroit, the combination of precisely engineered Kno-Draft dual duct high velocity valve attenuators and adjustable air diffusers provides a 500,000 sq. ft. interior with constant comfort.

The dual hot and cold high velocity air distribution system includes nearly 300 overhead and more than 700 under-window attenuators. These units accurately mix, proportion, and diffuse the air to the building's various rooms at precisely the desired volume and temperature. Kno-Draft attenuating and air diffusion equipment was selected because it responds most rapidly to changing loads . . . most suitably serves the wide variety of comfort demands of occupants in private offices . . . and sharply reduces operational costs.

The Connor Engineering Corporation is justly proud that Kno-Draft equipment was chosen for this leading Detroit building—an endorsement of Connor experience and performance. Numerous Kno-Draft dual duct diffusion models are available. One of these is engineered for your next building.

Request Bulletin K-33-A for complete information.

CONNOR... for Constant Comfort Conditions

CONNOR ENGINEERING CORPORATION

DANBURY • CONNECTICUT

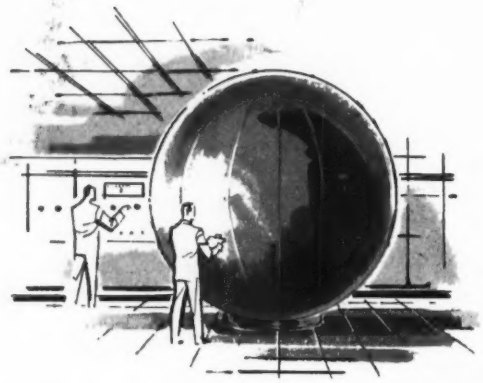
CONNOR ENGINEERING CORPORATION

kno·draft®

high velocity air diffusers

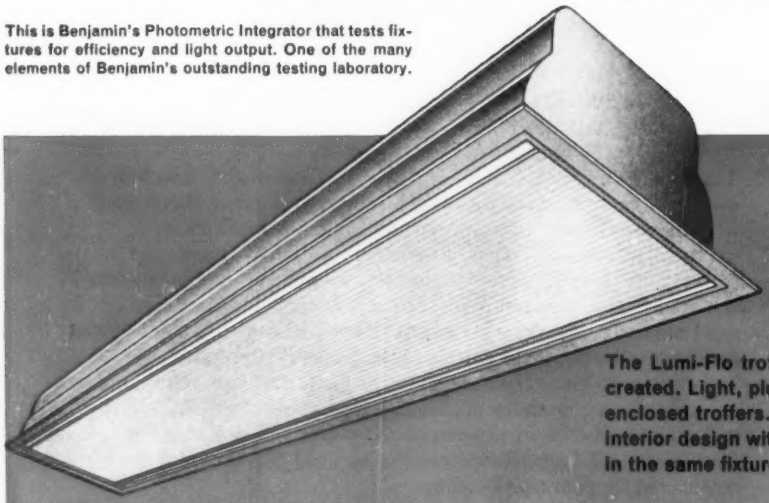
Men who are light years ahead specify...

BEN



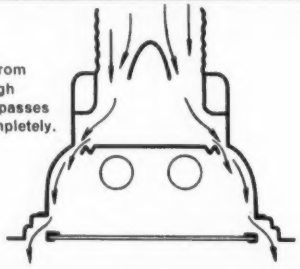
Look first to Benjamin for commercial or industrial equipment that can be depended upon to interpret your conception, functionally and aesthetically. A Benjamin lighting unit is available for any type of architecture and can be used daringly to create special dramatic effects—or conventionally for proven practical results.

This is Benjamin's Photometric Integrator that tests fixtures for efficiency and light output. One of the many elements of Benjamin's outstanding testing laboratory.

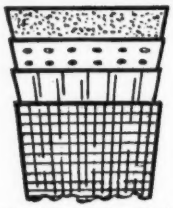


LUMI-FLO

The Lumi-Flo troffer. Truly the most versatile fixture ever created. Light, plus cool or warm air pass through glass enclosed troffers. Makes possible cleaner, more attractive interior design with air diffusion and illumination combined in the same fixture.



Air flows from duct through fixture—bypasses lamps completely.



Available in a variety of styles with glass or plastic lenses and aluminum or plastic louvers.



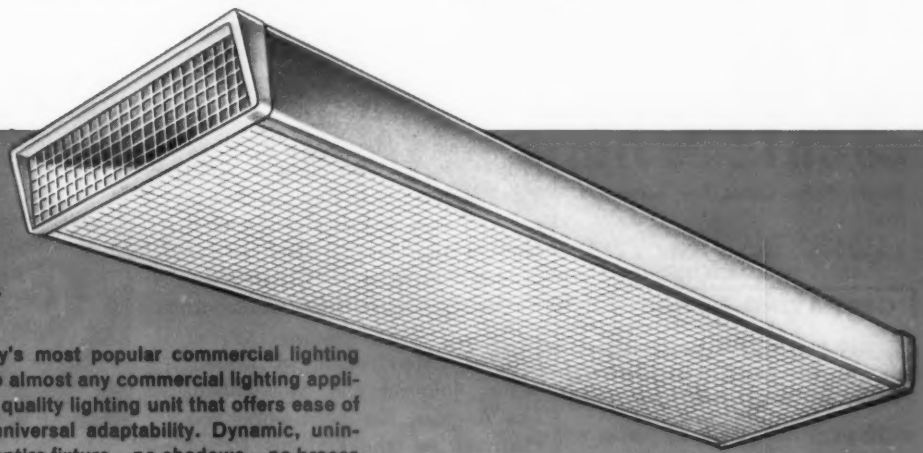
Enhances ceiling beauty—no more clutter of unsightly air diffusers.

jAMIN

Call on us early in the planning stages. Our field engineers are at your service with helpful ideas in planning creative lighting for any commercial or industrial application.

Literature is yours for the asking. Write to Benjamin Electric Manufacturing Company, Northwest Highway, Des Plaines, Illinois.

BENJAMIN ELECTRIC MANUFACTURING CO.
Des Plaines, Illinois
Subsidiary of
THOMAS INDUSTRIES INC.
BENJAMIN • MOE LIGHT • STAR LIGHT
ENCHANTE • SAN MARINO

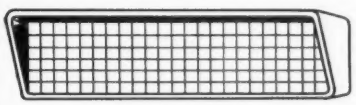


CATALINA

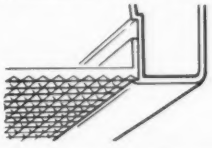
The Catalina. Today's most popular commercial lighting fixture. Adaptable to almost any commercial lighting application. A simplified quality lighting unit that offers ease of wiring layout and universal adaptability. Dynamic, uninterrupted light over entire fixture—no shadows—no braces—no dark spots.



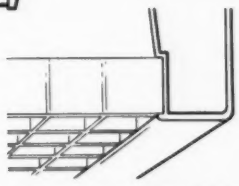
Harmonizing slim design—just 3½ inches from top to bottom.



Modern design decorative end caps of tough injection-molded plastic.

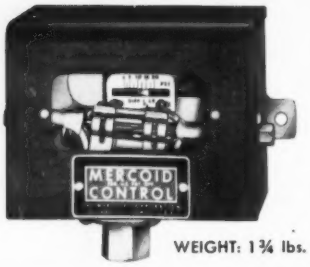


All new exclusive L-120 polystyrene lens. Unique debossed pyramid design.



45° x 45° louver in sparkling polystyrene. Has special half-inch cube.

NEW
Small, Lightweight
MERCOID
PRESSURE
CONTROL
AP-153

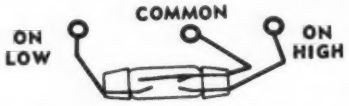


WEIGHT: 1¾ lbs.

FOR MEDIUMS NOT INJURIOUS TO STEEL OR SILVER SOLDER

CIRCUIT

SP-DT HERMETICALLY SEALED MERCURY SWITCH (4A. 115V., 2A. 230V.)



Provides any of following operations:

1. *Single Pole—Cut-in high (close on rise)*
2. *Single Pole—Cut-in low (open on rise)*
3. *Single Pole—Double Throw*

OPERATING RANGE

Adjustable Operating Range	Differential Fixed (Factory Set)	Maximum Surge Limits
1 to 20 psig	0.5 psig.	30 psig.

CONSTRUCTION

ADJUSTMENT: External
PRESSURE ELEMENT: Fairprene diaphragm
PRESSURE CONNECTION: ¼" I.P.S.
MOUNTING: Has two mounting ears (one on each side of control) or control may be pipe mounted by means of the ¼" I.P.S. bottom connection.
INTERNAL WIRING CONNECTIONS: 3 post terminal block.
CASE: NEMA 1—Heavy gauge steel, cadmium plated. Steel cover (with glass front) finished in charcoal-gray.

WRITE FOR BULLETIN 02

THE MERCOID CORPORATION
4201 Belmont Ave., Chicago 41, Ill.



Men in Engineering

Sargent & Lundy, Chicago consulting engineering firm, recently changed its organizational structure to give full departmental status to its nuclear activities. Alf Kolflat, the firm's senior partner, stated in his announcement of the change, "While Sargent & Lundy has long been active in the nuclear field, the growing importance of nuclear developments in the power industry has led us to place more emphasis on this phase of our work. The organizational change will greatly facilitate the efficient execution of our present and future nuclear projects." Fred W. McCloska has been named to head the department.

Hiram Leroy Smith, Jr., formerly project engineer for Stone & Webster Engineering Company, Chemical Division, has been appointed chief engineer in the Chemical Division, The Bowen Corporation, Cambridge, Massachusetts.

Irvan F. Mendenhall, of Daniel, Mann, Johnson and Mendenhall, Los Angeles, has been appointed chairman of the Citizens Urban Renewal Advisory Committee by Mayor Poulson.

The Houston engineering firm of Freese, Nichols, Turner and Collie has announced withdrawal of two Fort Worth members, Simon W. Freese and Marvin C. Nichols. Nat P. Turner and Robert M. Collie, Houston members of the firm, with the entire staff, will continue their engineering practice under the name of Turner and Collie, Consulting Engineers, Inc. The firm's Port Arthur office will continue to operate without change.

Four top executives of Stone & Webster Engineering Corporation have been elected vice presidents. They are: Harold F. Cleary and Donald N. McCord, construction



CLEARY MC CORD

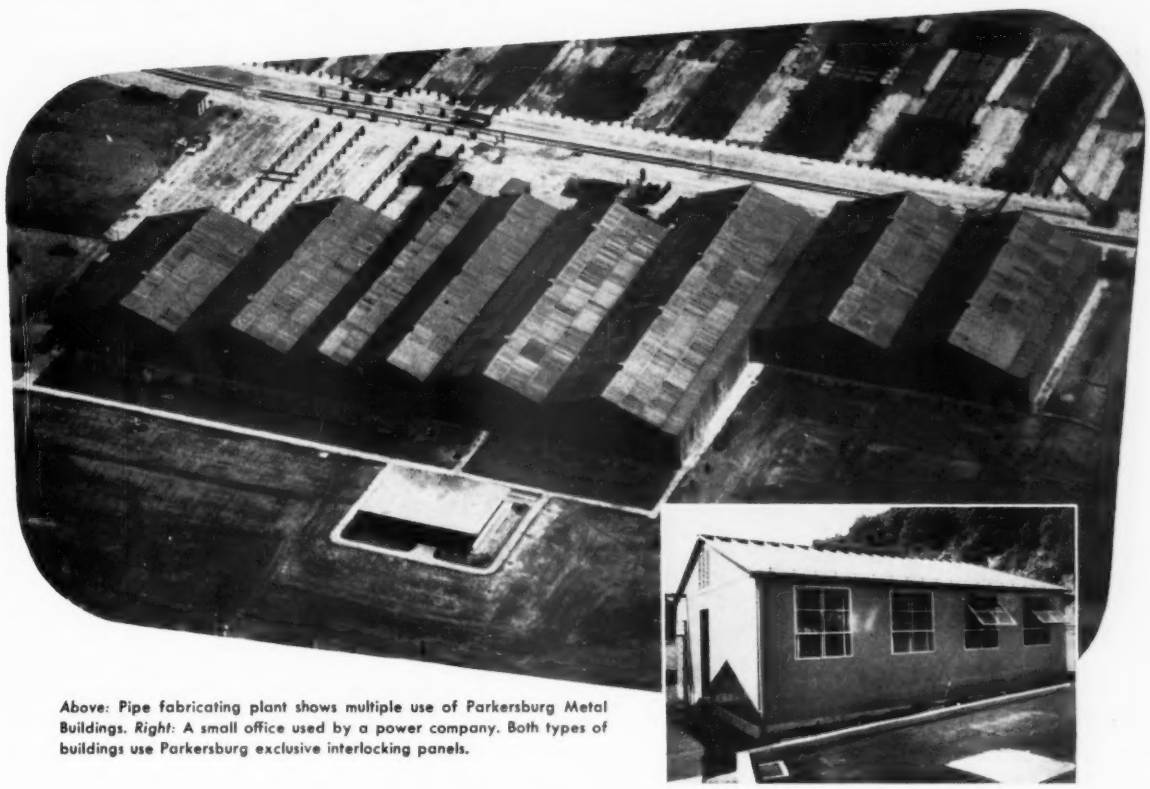


CUTLER PRANG

managers; M. H. Cutler, engineering manager; and William R. Prang, West Coast district manager.

The J. G. White Engineering Corporation has named Wilson C. Rich, Jr. as chief process engineer to head the firm's process division. Rich, for five years an independent consulting engineer, has a broad back-





Above: Pipe fabricating plant shows multiple use of Parkersburg Metal Buildings. *Right:* A small office used by a power company. Both types of buildings use Parkersburg exclusive interlocking panels.

Build exactly what you want . . . fast!

Versatility—that's the word for Parkersburg. And that's why you get exactly the building you need without compromise when you specify Parkersburg. It is the newest, broadest, most flexible metal building line on the market today.

And you get a high quality permanent building delivered and erected exactly when you want it—thanks to the most modern, precision mass production facilities in the industry.

For a tool shed or a multiple unit factory, an eye-appealing supermarket or a maximum utility warehouse, get the Parkersburg Plan. It will help you cut financing costs, erection costs and maintenance costs.

Just look in the yellow pages for your nearby Parkersburg Dealer-Erector or sales office, or write for Data Book BD-859-6.

PARKERSBURG METAL BUILDINGS

MBMA

BUILDING DIVISION • THE PARKERSBURG RIG & REEL COMPANY • PARKERSBURG, WEST VIRGINIA

*BARNEBEY'S NEW ECLECTIC READER**

LESSON III.

dŏg	prŏb'lĕm	răp'ĭd·ly
ac'tĭ vāted	chär'cōal	rē·cir'cû·lāte



A SWEET STORY

1. "Odor is our big problem," said Fred. "Our dog has a strong smell.
2. "So has our parrot," said Henry.
3. "I have an idea," said Fred. "A man at the zoo has a black box, shaped like a can, which blows air through it rapidly. It's great. It takes out all odors, better than anything."
4. "What is in the can?" asked the dog.
5. "Activated charcoal," said the parrot.

If you have a parrot, teach him to suggest the use of activated charcoal filters for odor removal in critical environments, and for important money savings in air conditioning, through recirculation of inside air. Ask for Bulletin T333. Send your parrot's name and address to Barnebey-Cheney Company, Columbus 19, Ohio.

Barnebey Cheney

*We gratefully acknowledge American Book Company's permission to use the illustration, and tip our hats to McGuffey whose First Reader is more than 100 years old.

ground of experience in the process field. He formerly was engaged in process design and economic evaluation at the Esso Research and Engineering Company, prior to which he was with Carbide and Carbon Chemicals Corporation.

Joseph Zelner has joined Victor Gruen Associates, Los Angeles, as project engineer. He formerly was with L. W. Davidson & Associates.

Walker Lee Cisler, president of the Detroit Edison Company, has been named to lead the 50,000-member American Society of Mechanical Engineers. Cisler heads a slate of four vice presidents and three directors chosen by the Society's nominating committee. The new officers will be installed in December, during the Society's Annual Meeting, in Atlantic City, following a mail ballot of the members.

The other nominees are: Charles H. Coogan, William C. Heath, Donald E. Marlowe, and Henry N. Muller, Jr. – vice presidents, and Everett M. Barber, Clarence C. Franck, and William H. Larkin – directors.

Robert N. Yoder, architect and Arthur E. Welker, engineer have been admitted as partners in the firm of Dalton - Dalton Associates, Cleveland, Ohio.

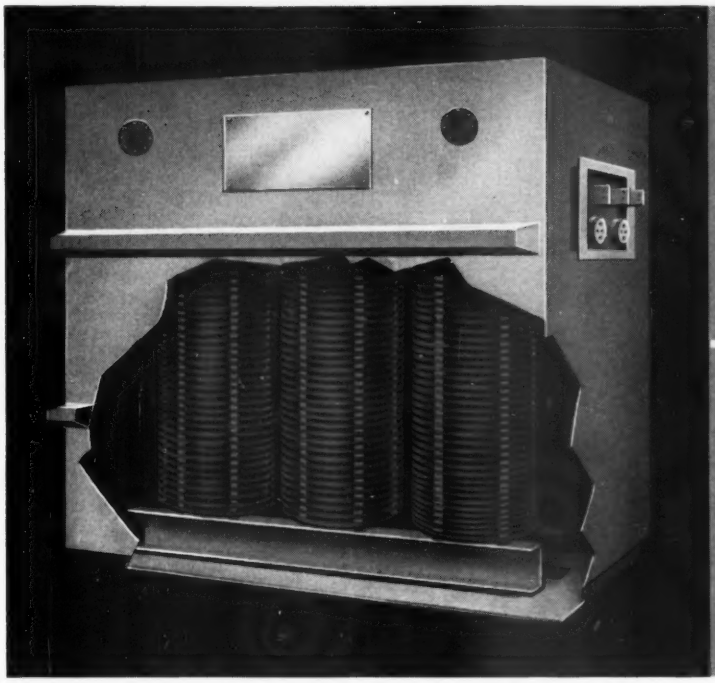
Martin Associates, consulting engineers, has moved its offices to 27 Silver Brook Road, Shrewsbury, New Jersey.

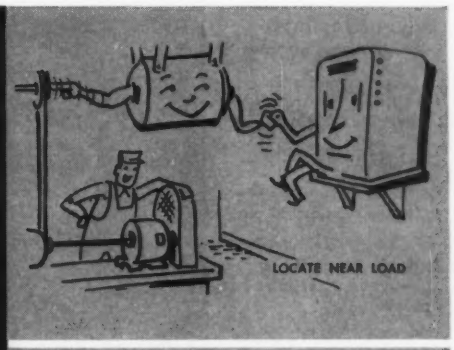
Register & Cummings Engineers, of Jacksonville, Florida, announces that Joseph R. Gordon, P.E., civil engineer, has been made an associate of the firm.

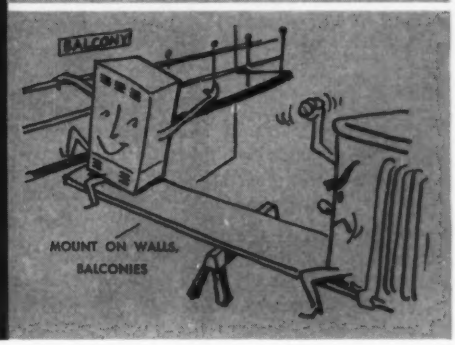
George A. Heap & Associates, Los Angeles, California, announces the association of the following specialized professional technical personnel as of July 1, 1959: architects, Robert L. Deines, Richard D. Bowen, and Robert C. Teel; engineers,

SILICONE NEWS from Dow Corning

Power Where You Want It







Check Inside: Where a Transformer Can be Located Is Largely Determined by its Insulation!

Whether you're modernizing or installing a completely new power distribution system, you can make certain that transformers will fit easily into any plant layout by specifying silicone insulated dry-type units.

Locate them near the load . . . on the floor, a balcony or the wall . . . anywhere! Insulated with Dow Corning Silicones, they are light-weight . . . space saving. Frequently no more expensive initially, they cost less to install, less to maintain, far less in the long run. Here's why:

Lowest Cost Installation: Easier to handle and easier to install, they require no costly vaults or barriers . . . can be placed right at load or load center for additional savings on costly low-voltage cable.

Lower Operating and Maintenance Costs: Virtually maintenance-free, silicone insulated transformers have no liquids to filter or change. Need no space heaters to keep windings dry when de-energized.

Maximum Reliability: Depending on design, they withstand overloads of 25% to 50% and more above rated capacity. The extra thermal capacity of silicones assures uninterrupted, reliable power.

Maximum Safety: Completely dry and completely safe, you can locate silicone insulated, dry-type transformers almost anywhere! No danger of fire . . . no toxic fumes. These units prove safe even under extreme overload and short circuit conditions.

Today, transformer manufacturers offer two basic designs insulated with Dow Corning Silicones — *sealed* and *open* dry-types.

For Load Center Unit Substations, you can achieve maximum reliability and minimum maintenance with a silicone insulated *sealed* dry-type unit. Requires only a periodic check of pressure gauge and bushings.

Or you can save weight by specifying a silicone insulated *open* dry-type unit. Up to 40% lighter than non-inflammable liquid filled units, they're ideal for balconies and other minimum floor loading areas.

Lighting Transformers and wall-mounted units are lighter per KVA than any other type. Locate them right at the load and save valuable floor space. They provide uninterrupted reliable power despite contaminated atmospheres, dust, dirt, moisture or high ambients.

Send today for full information on silicone insulated, dry-type transformers and list of manufacturers offering equipment insulated with Dow Corning Silicones.

Address Dept. 1021.

SPECIFY Dow Corning Silicones and **SAVE!**

first in silicones

Dow Corning CORPORATION

MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

SIDEWINDER OPERATOR
totally enclosed, low friction, powerful

NYLON BEARINGS
low friction, long lasting

CHEVRON PACKING
never needs adjustment

SHAFT
straight through, stainless steel or monel

DISC
one piece, cast in choice of materials

HYCAR SEAT
never needs replacement

BODY
cast iron or cast steel

the MONOFLANGE MARK II



the valve that industry demanded*

*The motivating force behind the creation of this, and other new products soon to be announced, was the obvious industry need for this type of equipment. Henry Pratt MARKET ORIENTED valves are all new for 1960.

Usually, the most significant contributions to industry stem from ideas born of experience. Such a contribution is the Pratt MONOFLANGE MARK II—a really different valve. The difference is in design and conception—for here is a valve designed to meet the ever increasing need for a compact and sensible 150# valve. Drop-tight and ideal for throttling service, the MONOFLANGE MARK II is a versatile valve. Even the manual and automatic operators are new—all enclosed, powerful, rugged, and reliable. For a high quality, reasonably priced valve, consider the MONOFLANGE MARK II. Full particulars are available. **Write for Bulletin 10-J**

HENRY PRATT®

Monoflange MK-II
RUBBER SEAT BUTTERFLY VALVE

Creative Engineering for Fluid Systems

HENRY PRATT COMPANY
319 W. VAN BUREN ST., CHICAGO 7, ILL.
Representatives in Principal Cities

Robert P. Case, George A. Heap, Whitney Joy, and Jules A. Juge; contractors, Larue Frey & Assoc.

Youngest man ever appointed to the Board of Engineering Registrations of the State of Oklahoma is Dave Benham, 40, senior partner of Benham Engineering Company, consulting engineers, Oklahoma City and Muskogee, Oklahoma. Benham was appointed by Governor J. Howard Edmondson to the five-member board to succeed Edward R. Stapley, dean emeritus, College of Engineering, Oklahoma State University. His appointment is for a five-year term to June 28, 1964. The Board of Engineering Registrations is responsible for the licensing of all professional engineers in the State of Oklahoma.



BENHAM HYDE

Judson G. Hyde has been elected controller of Burns and Roe, Inc., New York engineers and constructors. Before joining Burns and Roe, Hyde was treasurer-controller of Sperry Products, Inc. (Danbury, Conn.), and for many years was manager of the Stamford office of Ernst & Ernst, public accountants.

Ewin Engineering Associates announce the opening of its new offices in the Ewin Building, located at 5104 Mac Arthur Boulevard, Washington, D. C.

Dr. Egon P. Winter, economist and research planner, has established offices in Palo Alto, California for conducting economic research projects. Until recently, Dr. Winter had served on the planning staff of

Sewage Pump Well Elevation Held at 114.5′±3″ Despite Big Variations in Flow



Three of four E-M 200 hp, 1200 rpm Vertical Synchronous Motors with Adjustable-Speed Magnetic Drives at Nut Island Sewage Treatment Plant of the South Metropolitan Sewage System in Quincy, Massachusetts.

E-M Vertical Synchronous Motor and Magnetic Drive Unit for adjustable-speed power transmission to vertical centrifugal pump. The ring element (1) mounted directly on the motor shaft turns at motor speed. The magnet element (2), mounted inside the ring element, has no mechanical connection to the motor . . . torque is transmitted through magnetic flux linkage between ring and magnet. By varying amount of excitation to magnet, pump speed can be precisely controlled.

AMAZINGLY PRECISE CONTROL OF SEWAGE PUMPS OBTAINED WITH E-M ADJUSTABLE-SPEED MAGNETIC DRIVES

One of the critical problems in operating Boston's new Nut Island Sewage Treatment Plant is complete control over the wide daily, weekly or seasonal flow variations. For example, flows may vary from 63 mgd to 249 mgd, with peak loads of nearly 300 mgd during stormy periods.

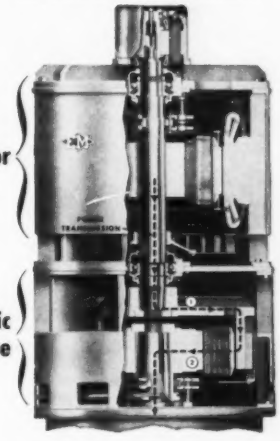
The pump well has to maintain an elevation of 114.5 feet with not more than 3 inches variation, to assure proper levels and flow velocities in the sewage processing channels. Control of the output of the low-lift sewage pumps has to be fast and remarkably accurate.

Use of E-M Adjustable-Speed Magnetic Drives for the low-lift pumps provides the sensitive speed control necessary in maintaining this close command of the pump well elevation.

Pump speed changes are dictated by a well float that actuates the Magnetic Drive through an E-M "Regutron" Control. Pump speed is automatically increased or decreased to maintain precisely the required pump well elevation. The Magnetic Drives are highly important and effective factors in most efficient operation of the Nut Island Sewage Treatment Plant for eliminating pollution in Boston Harbor.

For more information, see your nearest E-M sales engineer. And write direct for a copy of E-M Synchronizer No. 38 which tells the complete story of this outstanding installation.

ELECTRIC MACHINERY MFG. COMPANY
MINNEAPOLIS 13, MINNESOTA



E-M

Specialists in making motors do
EXACTLY WHAT YOU WANT THEM TO

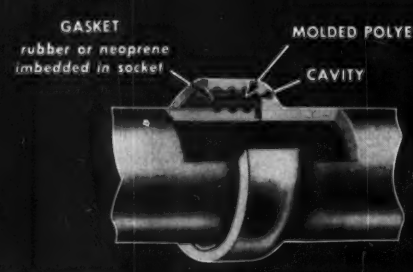
4400-TPA-2149

AVAILABLE NOW

VITRIFIED CLAY PIPE "it joints like magic"

Presto SEAL

As the name implies, Presto-SEAL is a vastly improved vitrified clay pipe that joints to a perfect, permanent, flexible seal in seconds . . . can be laid in upwards to 50% less time than needed with old fashioned pipe jointing methods. Simply lubricate the spigot end of Presto-SEAL with Presto-LUBE . . . align the bell and spigot . . . then push the joint together by hand. You actually *feel the seal!*



Presto SEAL COMPRESSION JOINT

Rigid polyester castings, and a flexible permanently imbedded gasket, produce a controlled uniform compression throughout the full circumference of the joint.

ASSEMBLES FASTER WITHOUT SPECIAL TOOLS

STOPS INFILTRATION

BUILT-IN SAFEGUARD AGAINST SHEAR LOAD ACTION

AVAILABLE IN SIZES FROM 4" TO 36"

KAUL clay company
TORONTO OHIO • U.S.A.

Write for complete information, including descriptive literature PS-101 or contact your KAUL representative today.

Wilsey and Ham Engineers and Planners, Millbrae. The new firm, located at 54 Roosevelt Circle, Palo Alto, will be handling land economics work, population forecasts, and economic aspects of budgeting for city planners, appraisers, engineering firms, architects, builders, and developers.

Willard H. Hart, structural engineer, has joined the staffs of Robert J. Strass, Inc. (Milwaukee) and Hartman-Strass, Inc., Consulting Engineers (Sheboygan). Hart formerly was with the Wisconsin Highway Commission, Portland Cement Association, and the American Institute of Steel Construction.

Roberts & Schaefer Company, engineers and contractors, has moved its Chicago offices from 130 North Wells St. to 201 North Wells St.

Dalton & Dalton, consulting structural engineers, recently moved to new headquarters, located at 384 First Street on Jack London Square, Oakland, California.

The Board of Directors of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers has appointed Robert C. Cross as executive secretary of the society. Cross succeeds Aubry V. Hutchinson, who is executive secretary emeritus.

Architect Jack Russell Rummell and engineer James J. Kesler have been elected associates in the Los Angeles, California architectural-engineering firm of Daniel, Mann, Johnson & Mendenhall.

The engineer-architect firm of DeLeuw, Cather & Brill has been dissolved but will continue to function with the present staff to complete all outstanding assignments. Clinton B. F. Brill and Benjamin Gray have formed the partnership of Brill & Gray to continue the engineering practice of the former partnership at 202 East 44th Street,

WHERE SAFETY CAN'T BE SECONDARY...

...select STANDARD



FIRE ALARM SYSTEMS

Where requirements are critical . . . where moral responsibility dictates a system that exceeds minimum ordnance regulations . . . look to Standard for the utmost in reliable fire alarm systems.

Standard systems incorporate every proven feature that can contribute to complete dependability of operation, including:

- Constant electrical supervision . . . *double supervision* in many systems.
- Extra quality components–from rugged resistors and heavy duty relays to positive action stations and soundly engineered signals.
- UL Listing on all components.

Request new 32-page Fire Alarm System Catalog. Ask for Publication No. 246.



EMERGENCY LIGHTING SYSTEMS

In hospitals, banks, stores, schools, public buildings . . . wherever the safety of human life or the protection of property is paramount . . . good sense suggests selection of a STANDARD centralized emergency lighting system, featuring:

- *Instantaneous, automatic* operation.
- *Constant* and *complete* electrical supervision (even a burned out bulb is indicated).
- Automatic recovery.
- UL Listings on all equipment.

Request 20-page Emergency Lighting Catalog. Ask for Publication No. 243.

75 years of progress — *Pioneer in 1884 — Leader in 1959*

THE STANDARD ELECTRIC TIME COMPANY | 89 LOGAN STREET SPRINGFIELD, MASSACHUSETTS



Travelling Display— Watch for showing in your area. See complete STANDARD Systems in operation.

MANUFACTURERS OF:



Emergency Lighting Equipment



Laboratory Panels



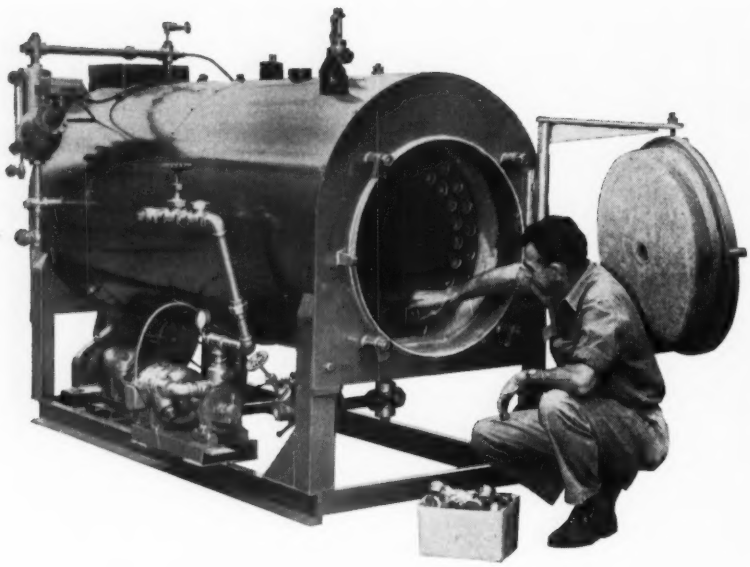
Hospital Signalling Equipment



Analogue Computers



Fire Alarm Systems



fast, easy inspection and maintenance

Continental

2-PASS AUTOMATIC BOILERS

The Two-Pass design of the *Continental* Boiler is the most practical and economical approach to heat transfer in Packaged Boilers today. In addition to eliminating separation or refractory baffles required in boilers with "excess" passes, it also provides design refinements which cut down on inspection and maintenance costs and keep down time to a minimum.

New !



Easy Accessibility

Continental design provides a ball bearing davited rear door that is opened in minutes. Door has substantial groove-type industrial packing for gas tight closure. This is a simple, practical, proven feature that means important savings for the life of the boiler.

Send for this Data File . . .

Get the facts on how a *Continental* Two-Pass Automatic Boiler can solve your problems. Write today on your company letterhead to Dept. CE-9 for latest data.

over a half century of boiler building experience

BOILER ENGINEERING & SUPPLY CO., INC.

Phoenixville, Pennsylvania

nation-wide sales and service in principal cities

New York, New York. DeLeuw, Cather & Company will maintain an eastern office at 361 Boylston Street, Brookline, Massachusetts.

Arnold W. Eckhoff, Jr., A.I.A., formerly an associate of Weed, Johnson Associates, has been made a partner in Rader and Associates, consulting engineering and architectural firm, of Miami, Florida.



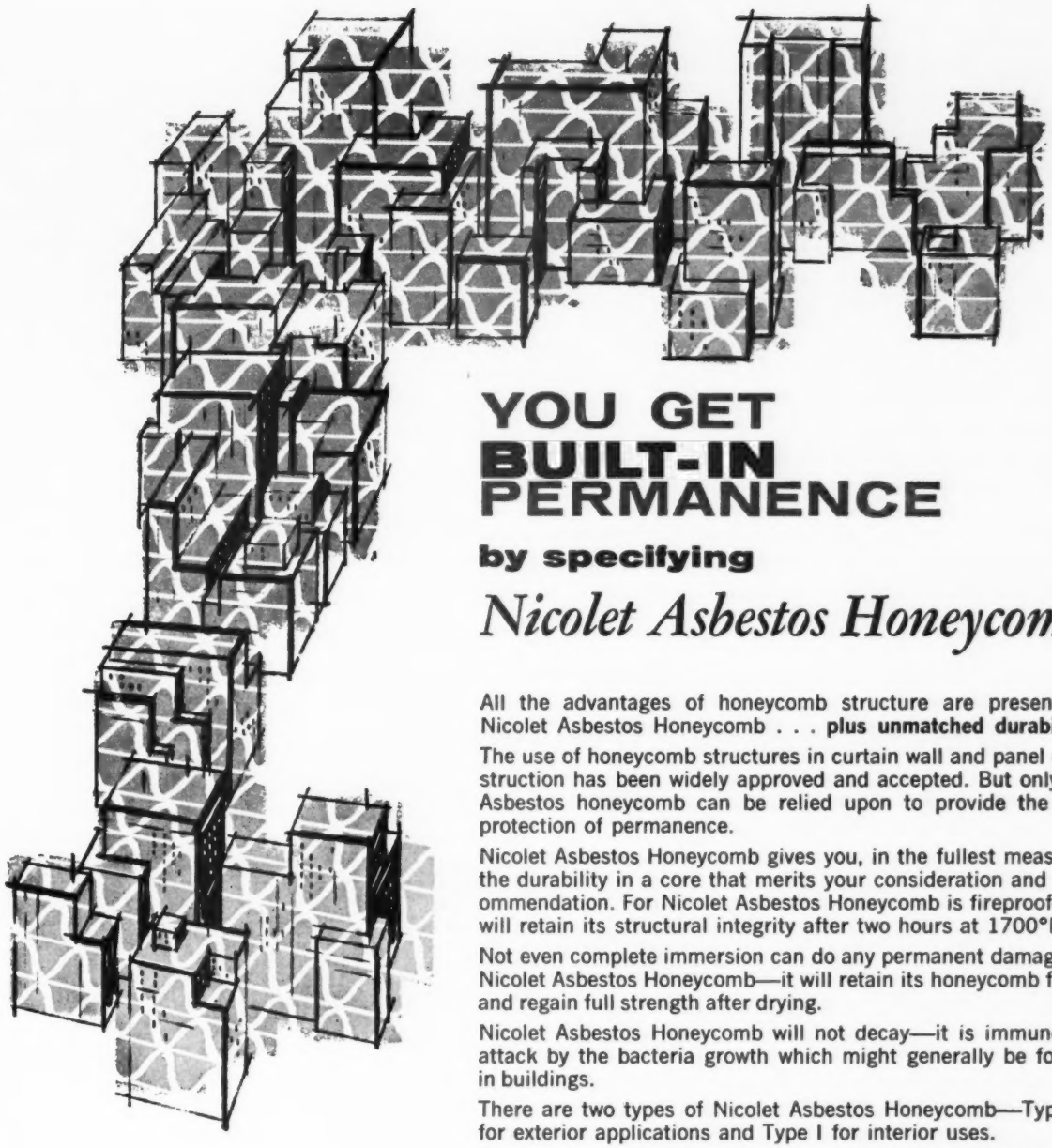
ECKHOFF HORN

Russell E. Horn has been named president of Buchart Engineering Corporation, consulting engineers of York, Pennsylvania. Horn formerly was executive vice president of the firm. In his new position he will direct and coordinate all engineering activities of the company's operations in highways, bridge, and structural work.

In other action taken before the board of directors, immediate past president, Clair S. Buchart, was elected chairman of the board. Lester L. Buchart remains as secretary-treasurer of the firm.

A new partnership, Ragon & Valentine, has been formed for the practice of electrical and mechanical engineering, with offices at 3093 Broad, Memphis, Tennessee. Principals of the new consulting engineer firm are James H. Ragon and Thomas L. Valentine.

Two personnel changes have been announced by Dames & Moore, soils mechanics engineers. Charles L. Nichols, associate in the Los Angeles office, has been transferred to the San Francisco office, and Don V. Roberts, who has been



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Nicolet Asbestos Honeycomb

All the advantages of honeycomb structure are present in Nicolet Asbestos Honeycomb . . . **plus unmatched durability!**

The use of honeycomb structures in curtain wall and panel construction has been widely approved and accepted. But only an Asbestos honeycomb can be relied upon to provide the full protection of permanence.

Nicolet Asbestos Honeycomb gives you, in the fullest measure, the durability in a core that merits your consideration and recommendation. For Nicolet Asbestos Honeycomb is fireproof—it will retain its structural integrity after two hours at 1700°F.

Not even complete immersion can do any permanent damage to Nicolet Asbestos Honeycomb—it will retain its honeycomb form and regain full strength after drying.

Nicolet Asbestos Honeycomb will not decay—it is immune to attack by the bacteria growth which might generally be found in buildings.

There are two types of Nicolet Asbestos Honeycomb—Type X for exterior applications and Type I for interior uses.

These are some of the advantages of Nicolet Asbestos Honeycomb—and only Nicolet brings them to you.

Progressive Engineers and Architects should investigate, for themselves, the benefits which the built-in permanence of Nicolet Asbestos Honeycomb offers. Write today for information.

NICOLET INDUSTRIES, Inc.

FLORHAM PARK, NEW JERSEY

Norristown, Pa.

Hamilton, Ohio

serving as quality improvement engineer for the firm, is taking Nichols' place as associate for the Los Angeles office.

George J. Gross, formerly with J. E. Greiner Company, Baltimore, has joined the U.S. Bureau of Public Roads as utilities engineer in the Regional Office at Hagerstown, Maryland.

The Paul Weir Company announces the occupancy of new space in Suite 3500 at 20 North Wacker Drive, Chicago, Illinois.

Wilsey and Ham Engineers and Planners has moved its southern California office to 800 W. Colorado Boulevard, Pasadena, to handle expanded operations in the area.

Dr. H. B. Maynard, president, H. B. Maynard and Co., Inc., consulting engineers, with headquarters in Pittsburgh, Pennsylvania, has been elected a Fellow of the International Academy of Management in Athens, Greece. He is the fourth American to receive the honor, among the 26 nations of the Western World that participate in the academy.

Dr. A. T. Liu, China-born engineer and project director of Giffels & Rossetti, Inc., Detroit architectural and engineering firm, has been appointed to the post of dean of the college of engineering, Detroit Institute of Technology.

Three structural engineers, Donald E. Anderson, Kenneth C. Naslund, and Jack R. Janney, have started a new consulting service, The Engineers Collaborative, at 116 South Michigan Avenue, Chicago, Illinois. The new firm also has a model analysis laboratory at 570 Northwest Highway, Des Plaines, Illinois.

As consulting structural engineering specialists, the firm will draw on the experience of its three principals and affiliated consultants, who in addition to usual structural engineering services will deal with such special problems as thin-shell structures, precast and prestressed concrete construction, vibration analyses, soil and foundation studies, and structural model analyses for highly indeterminate structures. Services will be nationwide.

Harry Czyzewski, Portland metallurgical engineer and vice president of the Consulting Engineers Association of Oregon, has been elected to the board of directors of the Consulting Enginers Council. Marvin W. Runyan, Portland civil engineer and a director of the Oregon group, has been named alternate to the national council.

Ford, Bacon & Davis, Inc., engineers and business consultants with headquarters in New York, announces the appointment of John G. Lewis as manager of the firm's new Pacific Coast offices at 235 Montgomery Street, San Francisco.

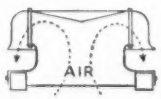
New low silhouette all-aluminum ventilators

COOK VENTILATORS
The Label of Quality



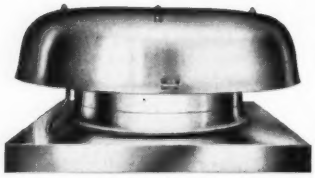
TYPE PR Pressure Relief Ventilator. Capacities: From 28.28 to 1866.5 sq. in. throat areas.

FEATURES:



All-aluminum construction. Inverted cone eliminates air turbulence. Can be used as air intake, in some cases.

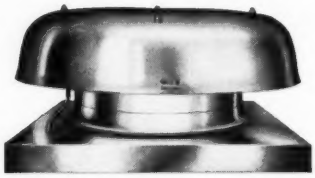
MEMBER: **AMCA** (Air Moving and Conditioning Association)



TYPE QD Direct-Drive Propeller Ventilator. Capacities: From 1200 to 38,350 cfm.

FEATURES:

All-aluminum construction, including propeller. Individually cast hub and blades. For larger volume air movement, particularly in factories and warehouses.



TYPE QL Belt-Drive Propeller Ventilator. Capacities: From 2960 to 18,570 cfm.

FEATURES:

All-aluminum construction. Propeller has stamped deep-pitched aluminum blades. Very quiet—suitable for offices, auditoriums, schools, etc.

Loren Cook Co. makes a complete line of spun aluminum axial and centrifugal flow ventilators.

See our condensed catalog 20c/CO in Sweets Architectural File and in Engineers Product File.

Write for free 20-page booklet, "Ideas for Moving Air". Contains helpful information and lists the entire Cook line.



COOK LOREN COOK COMPANY
Berea, Ohio

In Western Canada: H. F. Clarke, Ltd., 421 West Broadway, Vancouver, B. C.

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Specify RLM QUALITY industrial lighting fixtures



be sure to get the RLM high fixture quality required to UP-LIGHT to the new higher I. E. S. Recommended Industrial Lighting Levels...

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A *Because the RLM LABEL stands for the highest* ***certified quality*** standards for construction and performance in industrial lighting equipment. The recently published much higher Illuminating Engineering Society's Recommended Industrial Lighting Levels make quality equipment MORE IMPORTANT THAN EVER. The latest in illumination principles such as are assured by the RLM Label are vitally important to comfortable seeing at the new higher levels.

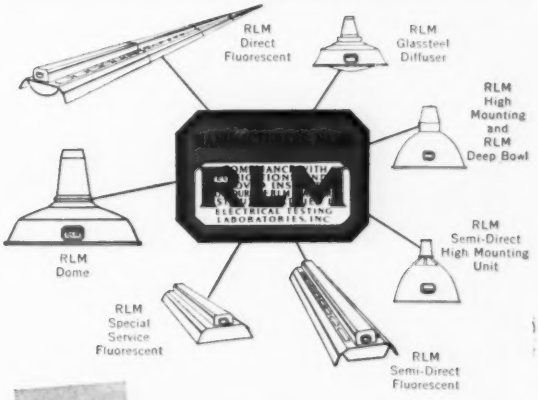
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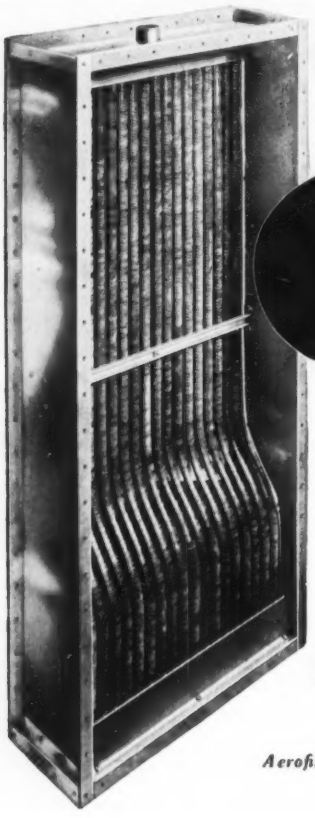
WALDO COWIN PLANT

At his desk, he is Fletcher Plant, registered professional engineer – a veteran of better than 40 years in the field – past president of both the Michigan Society of Professional Engineers and the Detroit Chapter of the group.

In the sanctuary, he is the Reverend A. F. Plant, administrative assistant to the bishop of the Episcopal Diocese of Michigan – a veteran of the cloth for five years.

And at the crossroads of the expanding cultural and medical center in Detroit (the Woodward-Warren area), he has combined both roles. In the construction of a $1.5-million Episcopal Diocesan Cathedral Center adjacent to St. Paul's Cathedral, Dr. Plant is serving as liaison man between the architects, Harley, Ellington & Day, Inc., who are represented by Lester H. Waldo, project administrator and Julian R. Cowin, executive vice president; the Chapter (governing group of St. Paul's Cathedral); and the bishop, Rt. Rev. Richard S. Emrich.

Jones, Henry & Williams, consulting engineers, Toledo, Ohio, announce admission to the partnership of Paul A. Harlamert, P. E. During the last 24 years, Harlamert has been commodity manager and regional manager for Johns-Manville Corporation in the Cleveland area. ▲▲



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Get the RIGHT Answer to your
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The right ratio of surfaces—the right materials—the right velocities—the right proportion between coil area and depth . . . there are dozens of factors that affect the efficiency, maintenance and service life of heat-exchange coils.

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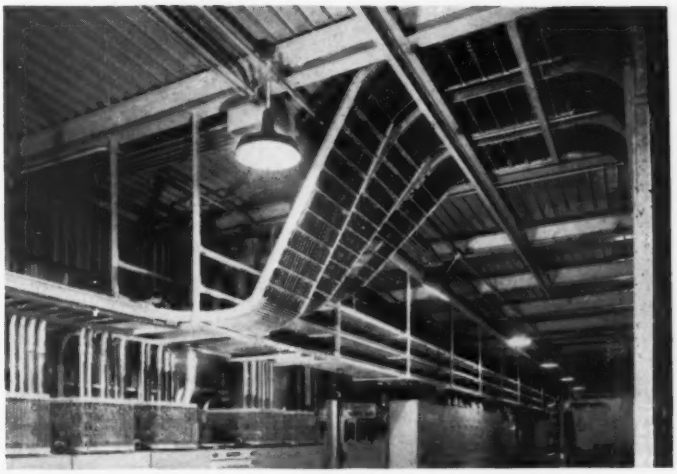
To get the *right* answer—ask the Aerofin man.

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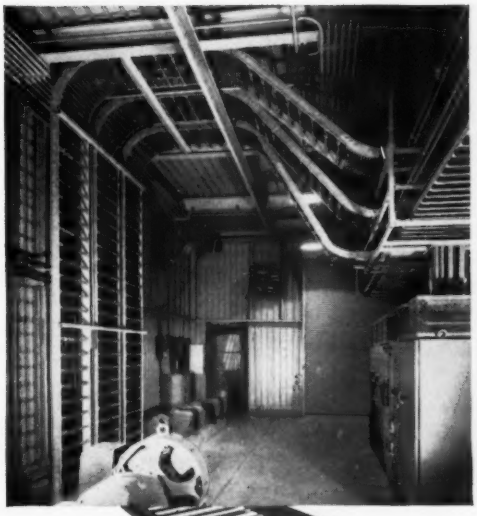
101 Greenway Ave., Syracuse 3, N. Y.

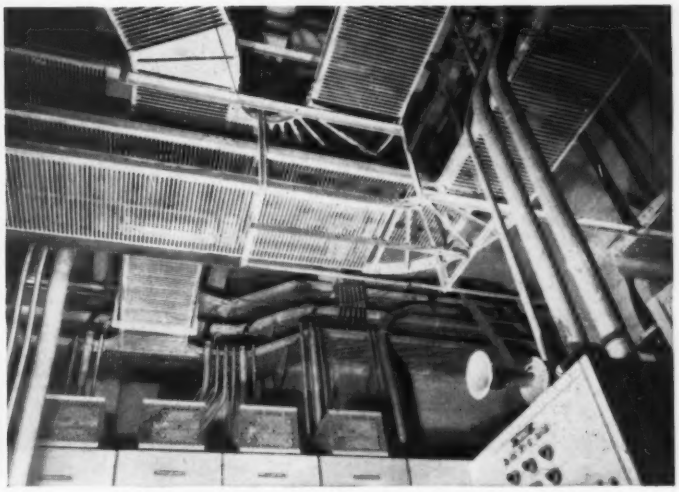
Aerofin is sold only by manufacturers of nationally advertised fan system apparatus. List on request.

how INLAND STEEL uses GLOBE INTERCHANGEABLE TRAYS to support cables in their Indiana Harbor Plant

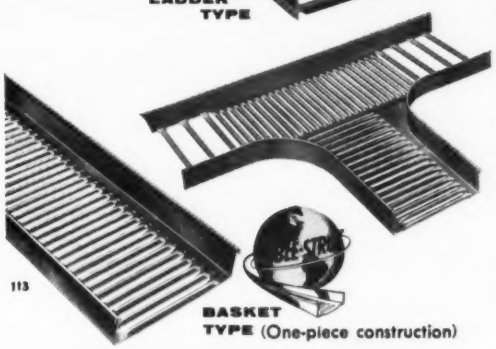


★ Engineered for Uniform Design and Easy Installation ★ Steel or Aluminum Construction
★ Complete Accessories for SPEEDIER Installation ★ Complete Interchangeability
★ No Sharp Edges to Damage Cables









Globe's two types of cable trays, one a ladder type and the other a basket type, to support cables, wiring and tubing have become increasingly popular because they can be used INTERCHANGEABLY at any given location depending on the type and weight of the cables to be suspended. The advantages of each type tray can be used to the fullest. Globetray, the ladder type, is intended for use where festooning is not a problem, while Cable-Strut, the basket type, is used for the support of communication wire, instrument tubing and control cables in automation applications.

These two cable trays have been thoroughly field tested in hundreds of large industrial installations, in new plant construction, in power plants and for power distribution in all types of manufacturing processes. Send for FREE catalog giving full information and installation techniques.

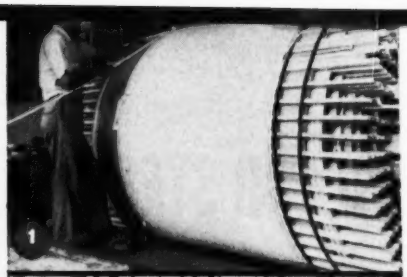
PRODUCTS DIVISION
THE GLOBE COMPANY Manufacturers since 1914
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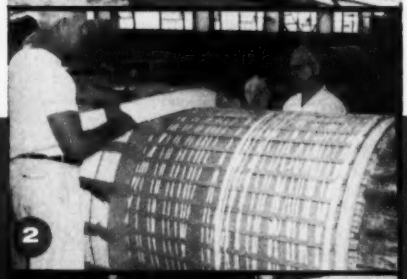
Representatives in all principal cities . . . consult the yellow pages in your phone book under "Conduits" for the one nearest you.

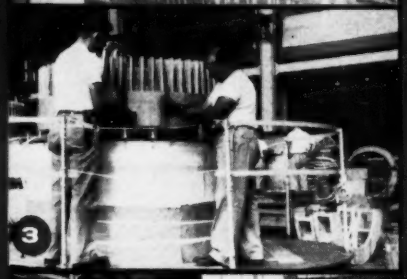
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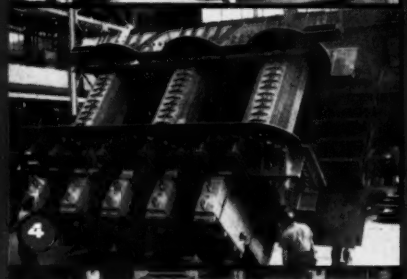
217,000 KVA, 230 KV TRANSFORMER

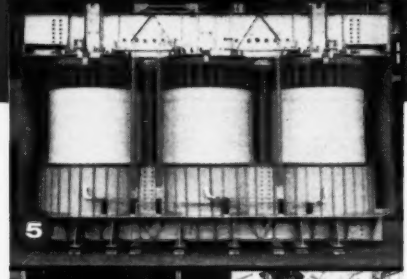
for POTOMAC ELECTRIC POWER COMPANY'S DICKERSON GENERATING PLANT

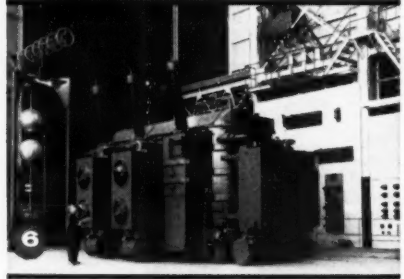


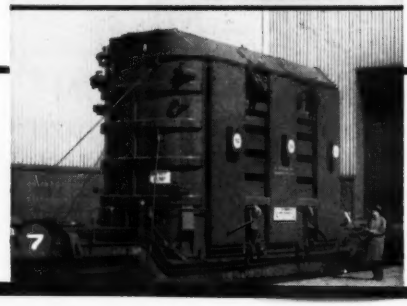




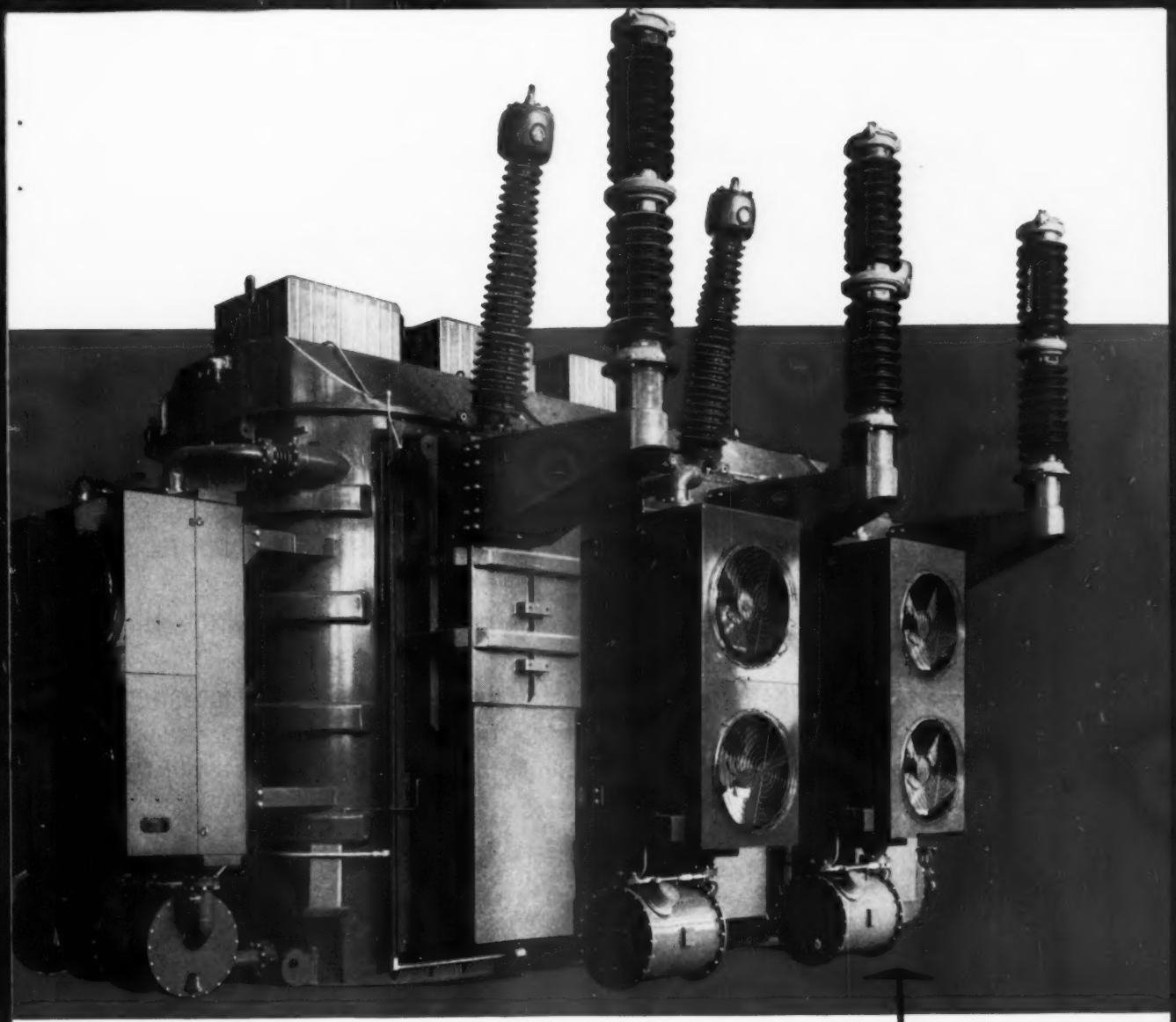








1. Winding High Voltage Coil
2. Winding Low Voltage Coil
3. Flanging High Voltage Coil
4. Raising Stacked Core
5. Low Voltage Side of Core-and-Coil Assembly
6. Testing Completed Transformer
7. Shipping Transformer



This power transformer is now installed at Potomac Electric Power Company's new 55 million dollar Dickerson Generating Station, located on the Potomac River in Upper Montgomery County, Maryland. The unit is a 217,000 KVA, three phase, type FOA, transformer having a high voltage rating of 234,000 Grd. Y/135,000 volts, with 2-2½% no-load taps above and below normal and a low voltage rating of 13,500 volts delta.

The transformer is connected through isolated phase bus duct to Unit #1, a 175,000 KW generator, which is the largest generating unit on the PEPCO system. The generated voltage of 13,500 volts will be stepped-up to 230 KV for transmisson. This transformer is an important link in the PEPCO system, and it exemplifies Moloney's ability to build large power transformers of any type or rating to customer's exact specifications.

For additional information on the engineering ability and facilities which make Moloney particularly well-qualified to build large power transformers, contact your Moloney representative. Specify Moloney Transformers . . . All Along The Line. MXSO-5

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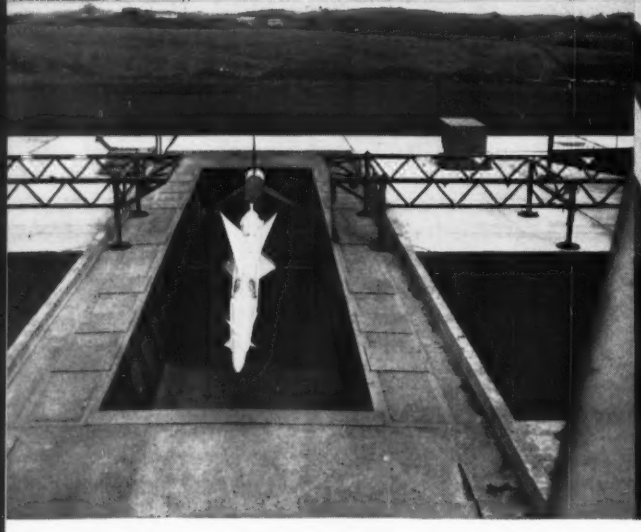
MOLONEY ELECTRIC COMPANY

Transformers For Utilities, Industry, and Electronic Applications

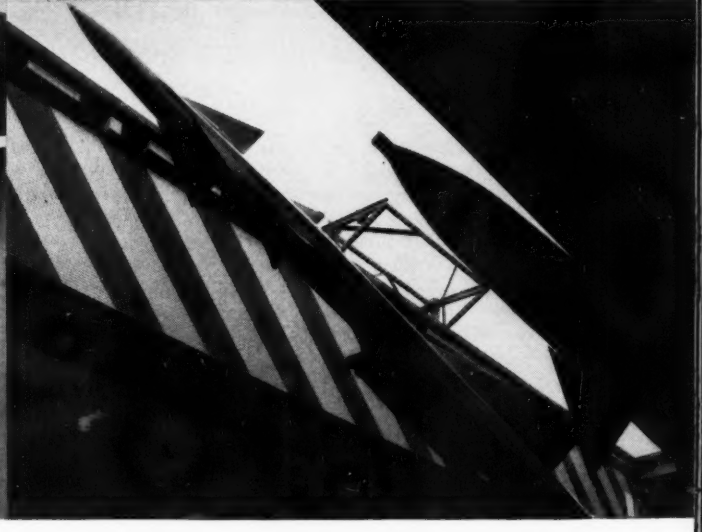
MOLONEY ELECTRIC

About the earthly side of the Nike Ajax.

The U. S. Army's Nike Ajax is a strange but potent bird. Graceful, tough, packed with delicate instruments. He will fly only once in his lifetime—only in the event of an enemy attack. To launch him with split-second timing and accuracy, the Army puts most of its manpower and most of its materials into ground equipment. And virtually all the material required other than electronic equipment can be purchased from one firm—United States Steel. Whether you're talking about carbon steel, high-strength low-alloy, or ultra high-strength alloy steels, Stainless Steel, steel fence,



The Nike Ajax spends his days in a concrete and steel nest like this one. ICBM's will also live this way, but in nests that will take *thousands* of tons of concrete and steel. U.S. Steel specialists work continually with designers and construction engineers to find ways to use steel to its full advantage on such projects to build stronger with less materials . . . to build them faster.



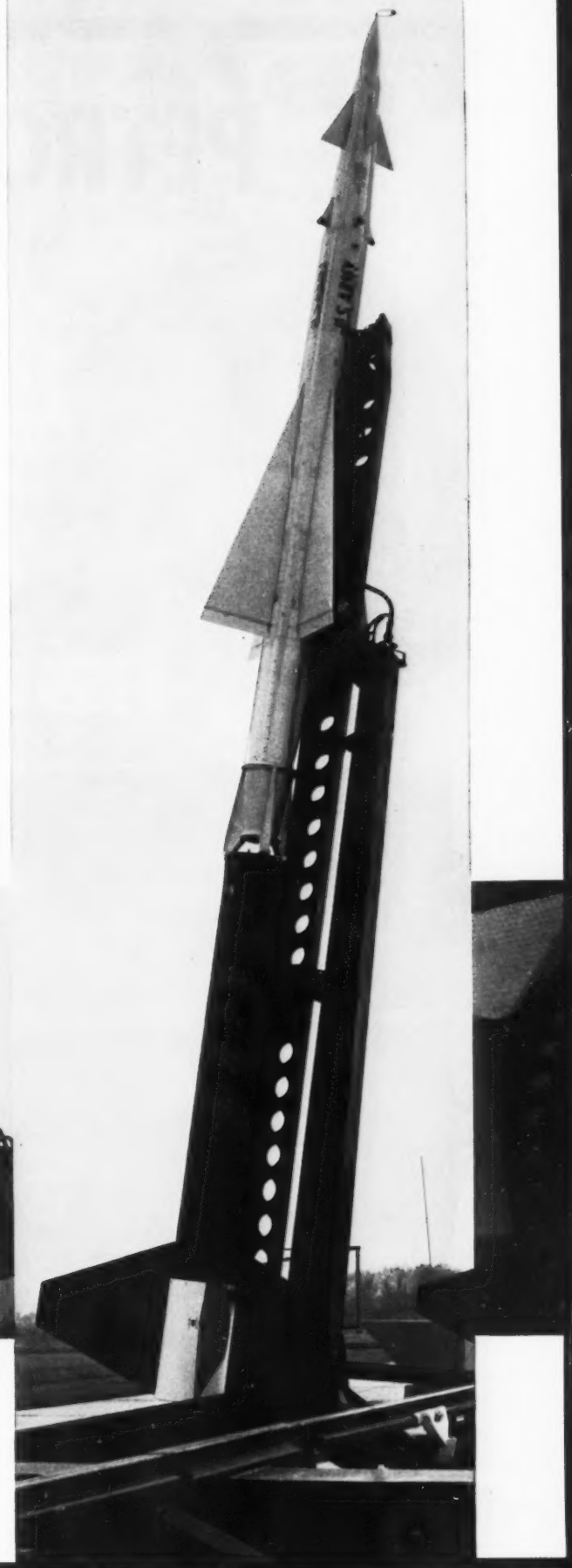
It takes miles of wire and cable to rig a Nike nest. It will take *hundreds* of miles when bigger birds are put to roost. The Army uses many types of steel and steel products in a Nike nest. U.S. Steel conducts research and knows how to cut costs for any steel product used in ground support equipment.

electrical cable, cement or wire rope, United States Steel maintains the technical services to provide the proper assistance to cope with any problem on materials for ground equipment. When a ground support program goes to the drawing board, consult with

United States Steel

USS is a registered trademark

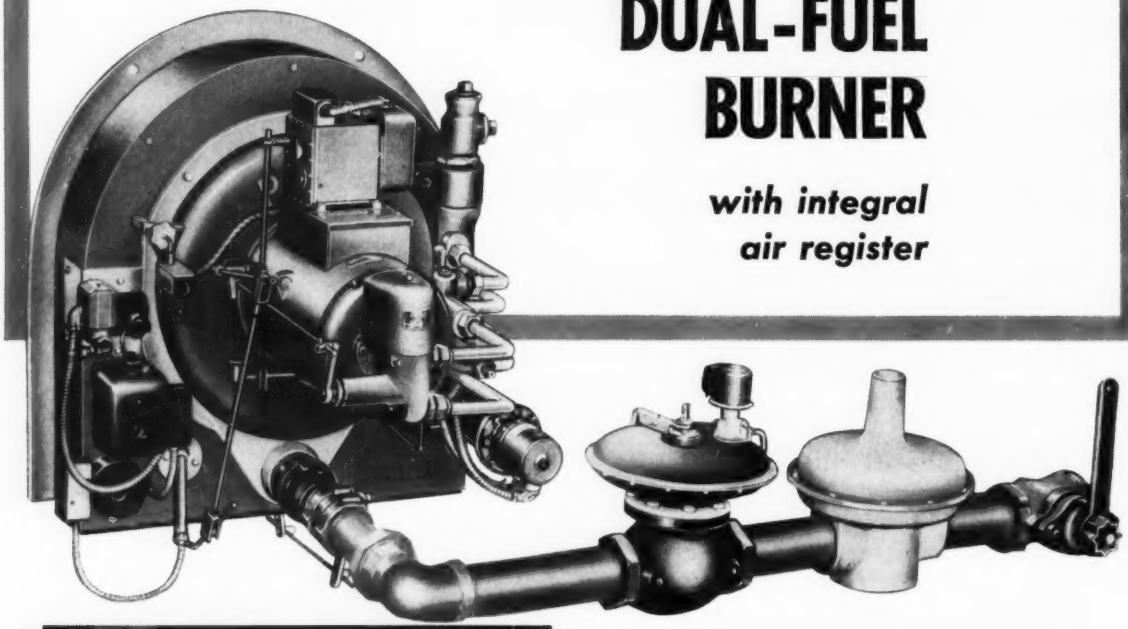


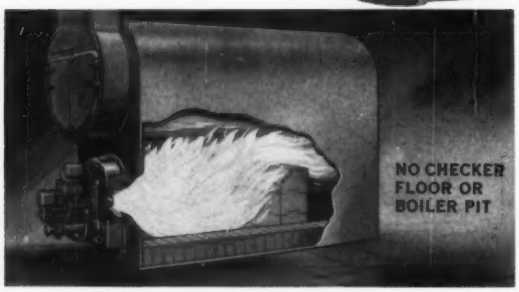


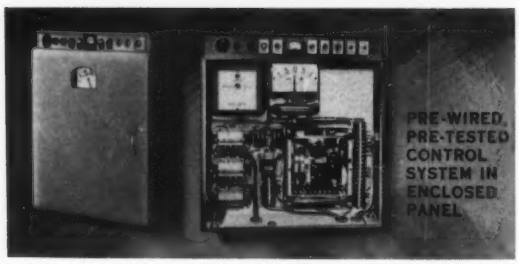
How light can you make a steel boom for any missile system without sacrificing strength? The proper selection of USS High-Strength Steels or Constructional Alloy Steels has cut the weight of similar equipment as much as ⅓—and *increased* the strength and service life.

PETRO INDUSTRIAL DUAL-FUEL BURNER

with integral air register







For natural or induced draft firing

The secondary air register is built into the burner!

The effect of this is plain to any heating engineer—no special construction is required to supply air to the combustion chamber. No draft door, no boiler pit, no checkered floor. Also the critical refractory combustion throat (so vital to efficient combustion) is pre-formed at the factory—you take no chances on local fabrication.

The burner (for either oil or gas, or dual-fuel combination) is remarkably free from mechanical complexities. It handles the heaviest oils or any type of gas with precision and dependability. *It stays on the job.*

Complete control systems are available from the factory. They are designed, built and tested with the same degree of care that the burner receives. The factory-integrated combination of the burner package and control system package provides maximum skill and undivided responsibility for the complete firing system.

Capacities: 30 to 450 boiler hp, gas or oil.

For further information, please mail coupon.

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Please send me literature and specification sheets on money-saving Petro Gas-Oil Burners.

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Books

Parallel Reading for Consulting Engineers

The Yale University Press has undertaken publication of all the identifiable works of Samuel Johnson except the *Dictionary*. This is no small project, and the issuance of the many volumes will take several years. Volume 1, *Diaries, Prayers, and Annals,* edited by E. L. McAdam, Jr. with Donald and Mary Hyde, has now been published and mailed to subscribers. Yale is distributing by subscription, an arrangement whereby the purchaser signs for the whole edition and pays for them ($10.00 each) as they are received through the years.

It is unlikely that the works of Johnson would have had much sale except among professional Johnsonians and scholars of the period except for the publication by McGraw-Hill of the Boswell papers. The volumes of Boswell so far published have had a good sale, which they deserve, and there are now many more general readers who, through Boswell, have an interest in Johnson. This is an amplification of an old condition rather than a new one, for any widespread interest in Johnson always has been a direct result of Boswell's writings.

It is difficult, sometimes, to understand Boswell's adulation. It is true that Johnson was a versatile scholar; he was undoubtedly a fascinating conversationalist; he was a prolific and competent writer; and he was a sort of awkward and unromantic Robin Hood who was kind to the deserving poor while a scourge to the pretentious. But this does not seem enough to have made him the idol of Boswell, who had met many of the great, including Voltaire and Rousseau. Boswell, himself, was a better writer than Johnson, and there were in England (even in Scotland) thinkers the equal of Johnson.

Why did Boswell set out to meet Johnson when he might have picked Locke, Burke, or Hume? Perhaps it was the *Dictionary*, for that had established Johnson as a literary figure. Boswell went to London and made his successful effort to meet Johnson just 10 years after the *Dictionary* was published. Johnson was, by that time, a literary figure. He had published an enormous amount of copy, but he was just starting his edition of Shakespeare, and most of his writing had been confined to prologues, dedications, introductions, and reviews. His *Lives of Poets* came much later.

Perhaps the answer lies more in Johnson's reputation as a conversationalist and a personality than as a writer. This is borne out in the inaugural volume of the Yale edition, for the reader is likely to find more exciting copy in the notes than in Johnson's own writing. What Johnson is said to have said is frequently more interesting than what he writes.

The editors have adopted an interesting method of annotation. Instead of a multitude of footnotes, they have provided a running commentary that occupies the lower third, more or less, of each page. This explanatory copy is placed in

new
lighting design by mc Philben





mcPhilben's new 37-60 line designed by E. Allan Rothman provides the most efficient lighting of fitting rooms, mirrors, stair landings, telephone bookstands . . . wherever localized illumination is desirable.

Available in both fluorescent and incandescent models offering these exclusive features: continuously hinged doors for easy relamping . . . all metal construction . . . baked on grey enamel finish . . . removable reflectors for easy access to electrical components.

37-60 Two 60 watt lamps
37-65 Two 15 watt T-8 fluorescent lamps

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WHEN SECONDS MEAN SAFETY . . .

Couch modular fire alarm systems are designed for flexibility — Building-block units in the control panels provide for more horns or bells per circuit — a wider variety of combinations — custom installation for complete and safe building coverage. U/L approved design to meet state and local codes. Your step-by-step guide to Fire Alarm System design, available on request, Couch Bulletin 131A

S. H. Couch Company, Inc.

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approximate juxtaposition with Johnson's own writing so that the reader gets two books in one.

It is unfair to judge Johnson as a writer on the basis of these scraps of diary and his prayers. These were written solely for his own eyes except, perhaps, for the *Welsh Diary*, which would seem to be intended as the basis for an unwritten "Journey to Wales." The prayers are excellent, but one can get too much rather rapidly. They follow closely the style of the *Book of Common Prayer*, in many instances merely being personalized rewrites. Admirable as they are, the general readers will find them a bit too rich when served in such quantity.

The engineer will be pleasantly surprised to find that Johnson was quite curious concerning industry and science. On many of his trips he made it a particular point to visit local industries. He was particularly fascinated by Boulton's factory, in Birmingham, and by a mirror factory in Paris. His description of the process used in making mirrors is concise, accurate, and interesting.

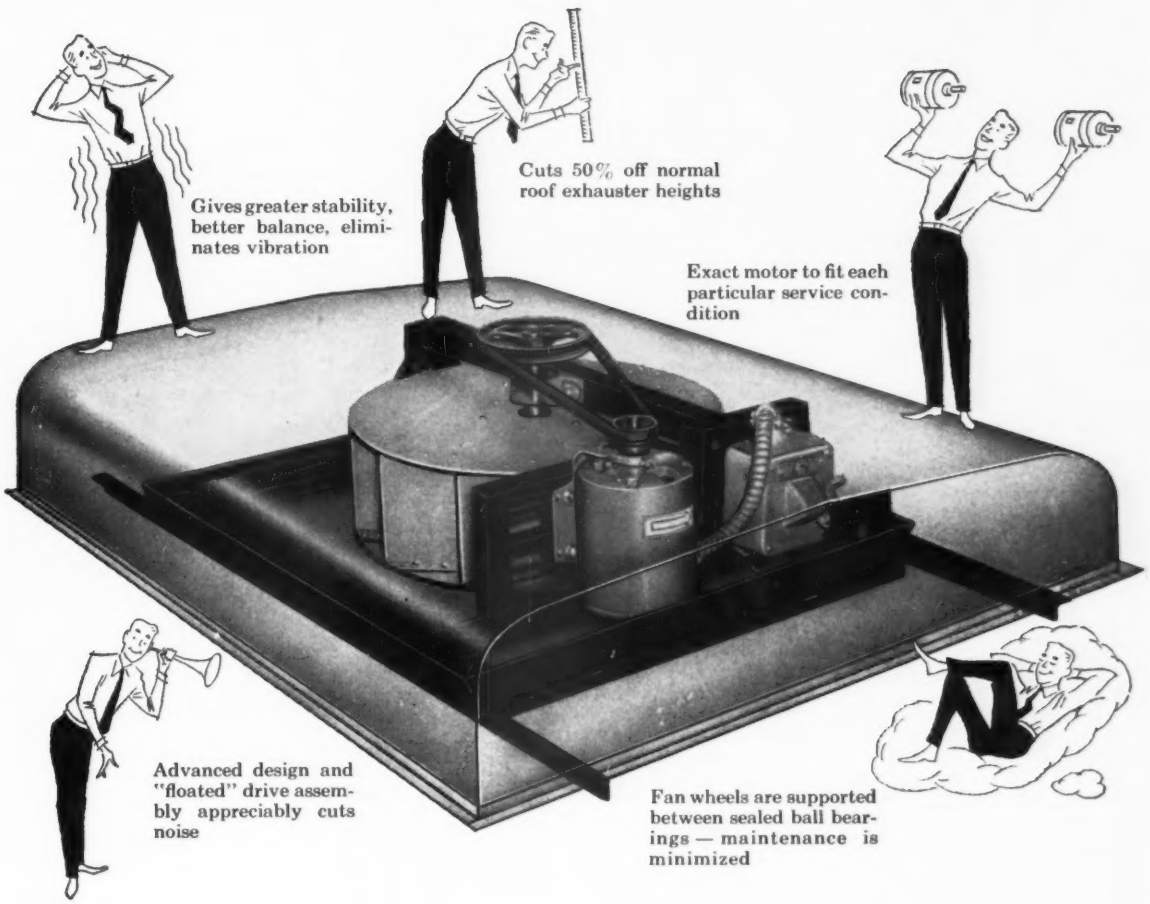
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In his novel, *Darkness at Noon*, Arthur Koestler's central character was motivated by a faith, eventually proved false, that the end justifies the means. Later, in *The Age of Longing*, a futile search for the absolute is the dominant theme. In a sense, both of these are combined in the real-life story of the men in whose hands "cosmology became a disciplined science." *The Sleepwalkers* is a detailed and critical narration of the frustrating attemps of these great minds to arrive, by whatever means came to hand, at the absolute – the physical universe as an orderly system.

But is the physical universe really an orderly system? There are times when its behavior throws out all order, and the scientist must begin again to construct a new system. Thus, it has been said that modern man has merely traded the

It's what you can't see that's important!

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"harmony of the spheres" for a simlar harmony of the atom. But time grows short, and instead of the centuries that stood between the theories of the ancient Greeks and the erratic genius of Kepler, only a few short decades have served to completely demolish the physical reality of the atom.

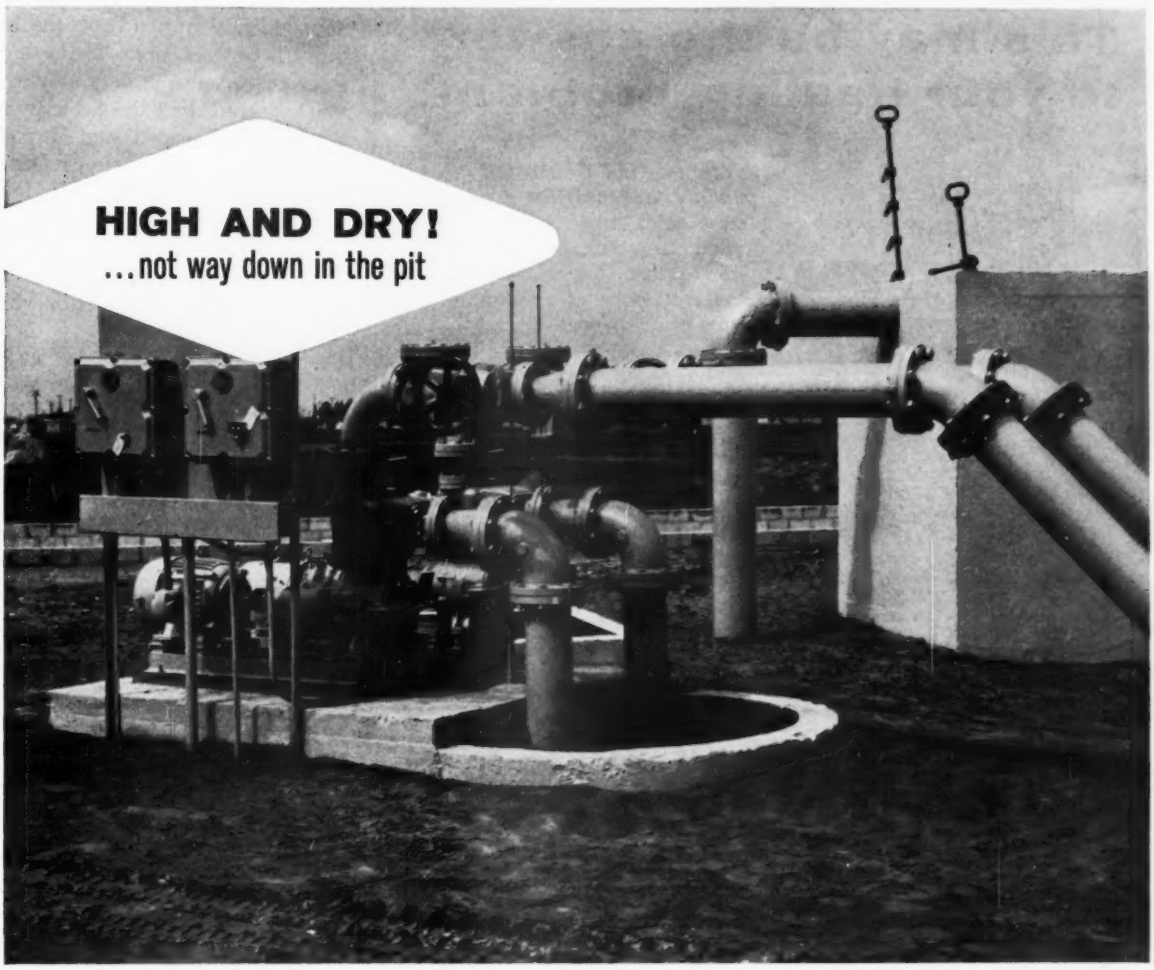
Koestler's book is not merely a vehicle for one man's philosophical musing. Rather, it is a skillful selection of biographical material put together to show how the lives and minds of certain great men were drawn together in reason, then torn apart by the emotional impact of wild fantasy.

For those of us who have assumed that the great scientific minds of the past belonged to great men, Koestler has no sympathy. Our heroes are revealed for what they are, timid to the point of cowardice, arrogant to the point of impossibility. In fact, the beatnik in today's world of art and poetry is cut from the same cloth as many of yesterday's great men of science.

It is to Koestler's credit that he takes no pleasure in the foibles of our heroes. His dispassionate appraisal is perhaps weighted by his own pessimism, for he is obviously sorry that the men of whom he writes are human.

Koestler clearly states his motives for writing *The Sleepwalkers* in his preface. First he tells us of his interest in the basic schism between science and religion, and second of his interest in the psychological process of discovery. But overriding these clearly stated motives is his evident preoccupation with the idea that most people are burdened, or perhaps comforted, with the belief that the progress of science has followed a course both rational and steady.

"Thus, in taking down Copernicus or Galielo from the pedestal, on which science-mythology has placed them, my motive was not to 'debunk,' but to inquire into the obscure workings of the creative mind. Yet I shall not be sorry if, as



Twin installation of Model 14A2-B at a sewage treatment plant, Clair-Mel City, Tampa, Fla. Controls alternate pumps at regular intervals.

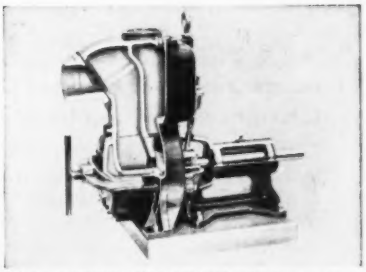
GORMAN-RUPP SEWAGE PUMPS

COST LESS TO BUY—Self-priming in lifts up to 15′, positive in action, nearly completely non-clogging. High and dry, their installed cost has allowed savings of as much as 50%.

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PERFORM WHERE OTHERS FAIL—In lift stations and sewage plants, these Gorman-Rupp units have shown amazing records of savings . . . operating where others have failed. Let us show you examples.

2″, 3″, 4″ and 6″ pumps—connected to your power or ordered complete with power units. Write for complete specifications.



FAST-ACTION END PLATE—Exclusive end plate releases for access to impeller and wear plate. Two-vane open impeller specifically designed for handling spherical solids.



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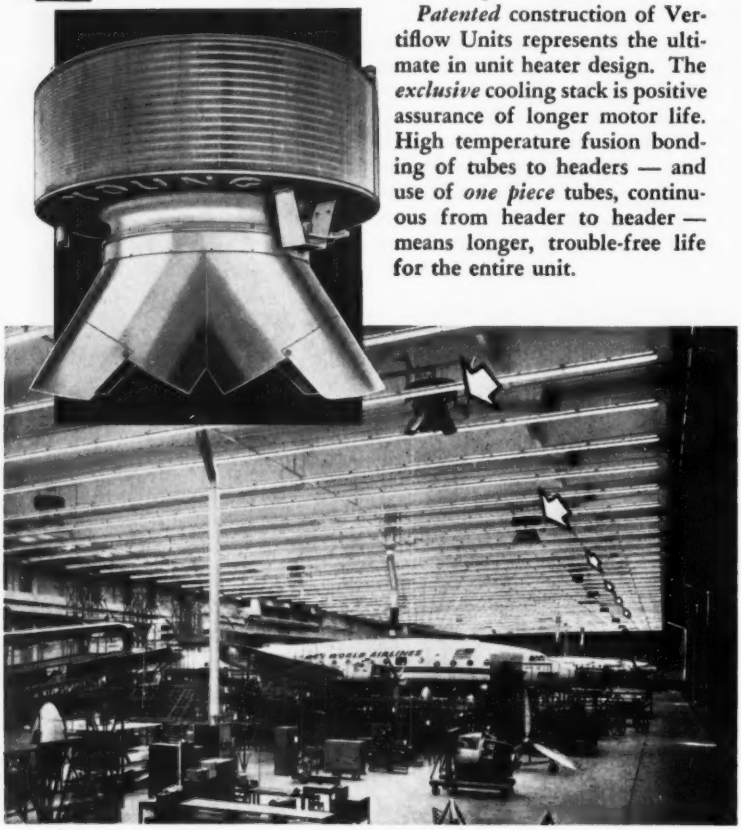
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This may be the answer to your heating problem!

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UNIT HEATERS
by Young

Vertiflow Unit Heaters are *specifically designed* for heating areas with high ceilings, or where large "clear span" areas are required. Twenty-two sizes, and a selection of six different types of diffusers assure a choice to meet the specific need — according to the capacity and blow-down requirements.

Patented construction of Vertiflow Units represents the ultimate in unit heater design. The *exclusive* cooling stack is positive assurance of longer motor life. High temperature fusion bonding of tubes to headers — and use of *one piece* tubes, continuous from header to header — means longer, trouble-free life for the entire unit.



Giant Overhaul Hangar Utilizes 36 Vertiflow Unit Heaters by Young to Warm 18,480,000 Cubic Feet

This giant TWA Overhaul Hangar at Kansas City, Mo. has two interior areas, each 160′ x 818′ free from any obstruction (made possible by the shell and cable design of the roof), and is capable of servicing 10 Lockheed Super Constellations at one time. Vertiflow Heaters, with Dual Jet Revolving Diffusers, are suspended 45 feet above the floor . . . providing an adequate flow of warmed air to all areas.

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Creative HEAT TRANSFER ENGINEERS
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an *accidental* byproduct, the inquiry helps to counteract the legend that Science is a purely rational pursuit, that the Scientist is a more 'level-headed' and 'dispassionate' type than others (and should therefore be given a leading part in world affairs); or that he is able to provide for himself and his contemporaries a rational substitute for ethical insights derived from other sources."

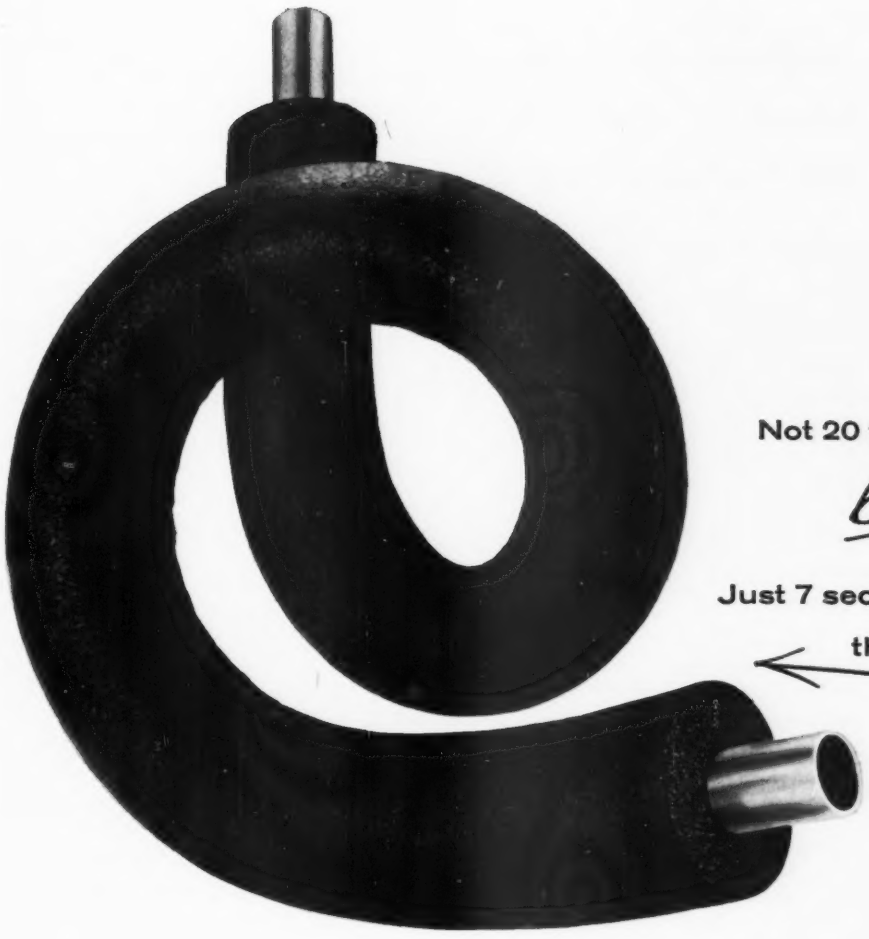
If Koestler has erred, he probably has done so more in his selection of a title than in anything he has said in the book. Titles should be justified and of his, Koestler has this to say ". . . the manner in which some of the most important individual discoveries were arrived at reminds one more of a sleepwalker's performance than an electronic brain's."

But the men of whom Koestler writes were not asleep. Sometimes they did not see well, and sometimes not at all. But they were awake, and driven by human motivations. For all of us, wise or foolish, seem to be gifted with the knowledge that we are a product of our environment. We go through life trying to alter that environment, to make it a product of ourselves, rather than we of it. For the engineer, it may be enough to pave a road or air condition a building. For the men in whom Koestler is interested, it is enough only if they can recreate the universe. No electronic brain is so awake, so gifted!

•

To the consulting engineer firm *How to Become a Professional Engineer,* by John Constance, might be a worthwhile investment if only because of the brief, but evidently sincere, description of the personal satisfaction the engineer can achieve in the consulting field. Constance says, "Of the many fields of endeavor that interest the engineer . . . consulting practice is the most satisfying and inspiring."

In a more practical vein, the consulting firm interested in employee



Not 20 to 30 minutes—

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Just 7 seconds to insulate this bend!

New Johns-Manville AEROTUBE insulation

cuts labor costs 50%...and more!

New Aerotube® Insulation entirely eliminates twine wrapping, skirting and other time-consuming methods of insulating lines that sweat!

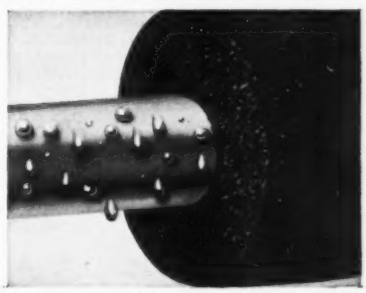
On a straight run of pipe or the most complex bend—Aerotube goes on fast! Just slides on new lines . . . six feet at a time . . . in a matter of seconds! On connected pipe, the job takes but little longer. Just the time it takes to slit Aerotube longitudinally, snap on pipe, and cement.

With all its savings in time, Aerotube gives you better results! Its unique closed-cell structure helps seal against heat transfer . . . gives Aerotube a built-in vapor barrier that retains its integrity indefinitely.

Use Aerotube wherever an effective vapor-sealed insulation is needed—air conditioning run-outs, CO_2 lines, dual temperature systems, on any line (to 200F) where Aerotube's labor savings will repay its slight additional cost many times over!

Send for informative new AEROTUBE brochure, IN-213A. It illustrates methods of fitting AEROTUBE to all types of fittings . . . sweat and screw type joints . . . and connected pipe. Gives best thicknesses for various design conditions, with helpful facts on sizes, packaging data and dimensions. *Write for your free copy now!* Address Johns-Manville, Box 14, N.Y. 16, N.Y. In Canada, Port Credit, Ont.

Flexible new foamed plastic insulation



Aerotube insulation is its own vapor barrier.

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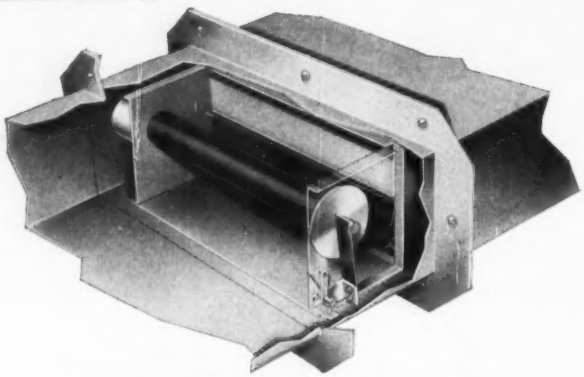
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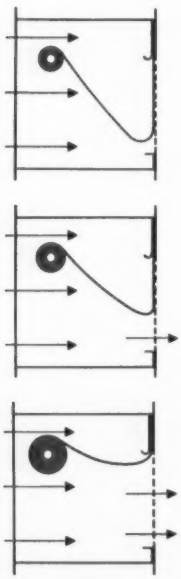
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Self-operated control tames high-velocity air



Barber-Colman Model SCR constant volume regulator

...simplifies stabilization, maintains cfm delivery within ± 5%



Changes in static pressure cause the flexible diaphragm to move up or down automatically to control the open area of the discharge plate.

The Barber-Colman Model SCR constant volume regulator reduces high-velocity air to conventional velocities and delivers a constant cfm flow, regardless of pressure changes upstream.

This regulator is applicable anywhere in a duct system where there are changes in static pressure. No motor operator or other power source is required. The regulator is factory-set to meet job requirements but can be easily adjusted in the field should requirements change. Fully proved in service, this dependable control simplifies system design and stabilization.

Constant volume regulators can be used in low-velocity systems and provide self-balancing operation when installed in low-velocity branch ducts.

The Model SCR regulator also is available as an integral part of Barber-Colman complete double-duct control units which incorporate hot and cold air mixing valves actuated by a single motor operator.

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BARBER-COLMAN COMPANY

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development will find the book both an inspiration and practical guide for younger members of the staff who are concerned about professional growth. A chapter also is devoted to eminence as a means of qualifying for registration by older engineers. In addition, it provides an excellent summary of the state registration laws which may be of practical value to firms about to engage in out-of-state practice for the first time.

•

Modern Jupiter by John Anderson Miller is another good example of the fact that the lives of great engineers make great stories. This simple biography of Charles Proteus Steinmetz is a fascinating collection of great engineering achievements, petty personal quirks, and warm friendships. Perhaps no better insight into the Steinmetz personality can be gained than from this brief notation, written in his diary while afloat on Viele's Creek near Schenectady.

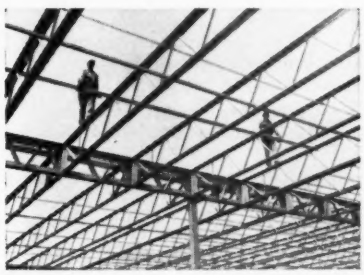
"It was a hot sunny day with almost no wind and I sat in the sun, swore at the leaking canoe, and calculated instances of the condenser discharge through an asymmetrical gas circuit."

Indirectly, it was politics that steered Steinmetz to the United States. We can be grateful for the schoolboy excursion into socialism that sent him on his way, and so can the City of Schenectady. For in the one brief flurry of political activity that marked his life in this country, he did much for the educational and park systems of that city. The naivete of some of his opinions during the days preceding World War I are easily forgotten against the broad background of his engineering achievements and evident humanitarianism.

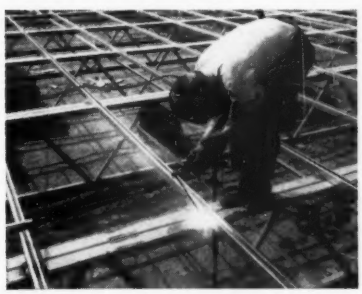
It was characteristic of Steinmetz that he never became contemptuous of the things he knew most intimately. To those who saw him shuffling about in heavy rub-



Every phase of the roof deck construction is illustrated in this view: Joists, box section sub-purlins, 2" Tectum plank, built-up roof, gravel coating.



Workmen are shown carrying several 34′ long lightweight box sections in the initial phase of the job. The sub-purlins are aligned in position with precision jigs and then fillet welded at each joist crossing.



Welding at each joist crossing provides lateral strength and continuous beam action. Note weld is hidden from view below, by joist.

Saved 50% on Sub-Purlins and Erection, 80% on Painting Costs with the

NEW TECTUM® BOX SECTION ROOF DECK ASSEMBLY

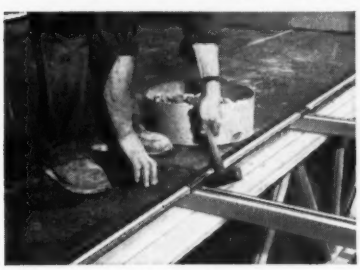
Combining pre-painted bar joists, Tectum galvanized box section sub-purlins and factory-finished Tectum roof deck planks, eliminated 80% of normal painting costs for the interior of the new Scott Chemical Warehouse, Marysville, Ohio.

Other major savings were indicated by James Campbell, President, James Campbell Associates, Inc., Engineers and Builders. "We are extremely pleased with the speed with which the new Tectum roof deck assembly was completed. Tectum's new box section sub-purlins are light, easily handled and the space provided between joist and roof deck offers many economies in the hanging of pipe, conduit and other utilities. The new system is a time-saver from every standpoint and the appearance is excellent."

Tectum roof decks insulate, absorb sound, have good structural strength and are noncombustible. In combination with the new Tectum box section sub-purlins, Tectum roof deck assemblies offer many ways to cut costs. Ask your Tectum representative for complete information. New Catalog now available. Tectum Corporation, Newark, O.

Tectum

Building: Scott Chemical Company, Marysville, Ohio. *Engineers & Builders:* James Campbell Associates, Inc., Marysville, Ohio. *Tectum Erector:* Bard Roofing & Sheet Metal Co., Columbus, Ohio.



High speed clips are driven over tongue of plank. Tectum planks span three sub-purlins giving added lateral strength. This operation is quickly accomplished; saves time.



The finished deck is clean, light reflective and maintenance free. Tectum insulates, absorbs sound, is structural and noncombustible in accordance with Federal Spec. SS-A-118b.



In this close-up, the facility with which the sprinkler system was erected indicates a typical time saving advantage of the new Tectum roof deck assembly. An estimated $3000 was saved on the erection of the sprinkler system.



CONCO
Custom-Engineered
Overhead Electric
CRANES

Featuring "CONCO-INCHMASTER"* control for calibrated, locked-in inching speeds that cannot vary regardless of weight load.

Conco builds cranes for virtually every class of service — both standard and highly specialized designs — including spark and explosion proof cranes, circular cranes, two-hook cranes, indoor-outdoor cranes, and cranes employing closed circuit TV for remote control operation. A complete design service, including sample specifications, is available — backed by 35 years experience. Write us, stating your requirements, or request Bulletin 5000A.

*"CONCO-INCHMASTER", available on all Conco Overhead Electric Cranes, provides inching speeds as low as 10% of top speed, and constant from 0% to 100% of rated load capacity.

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AFFILIATE: Conco Building Products, Inc. - Brick, Tile, Stone

Conco CRB Electric Crane used for indoor-outdoor service at Underwriters' Laboratories, Chicago, Ill.



ber overshoes regardless of the weather, it was just another of the many quirks of genius. To those who knew him, it was a mark of respect to the power of electricity, about which he knew so much.

Shortly before his death, Steinmetz said, "If I were able to bequeath to every young man one virtue or quality, I would give him the spirit of divine discontent, for without it the world would stand still." The progress of engineering and science since 1923 is a good measure of the fulfillment of that wished for legacy.

•

Books Reviewed in This Issue

Samuel Johnson: Diaries, Prayers, and Annals; $10.00; The Yale University Press; New Haven, Connecticut.

The Sleepwalkers, by Arthur Koestler; $6.50; The Macmillan Co.; New York, N.Y.

How to Become a Professional Engineer, by John Constance; $5.50; McGraw-Hill Book Co.; New York, N.Y.

Modern Jupiter, by John Anderson Miller; $4.00; ASME; New York, N.Y.

To get your copy of these books, order through your local book store, or we will order the volumes for you at regular publishers' prices.

•

New Technical Books

THERMODYNAMIC AND TRANSPORT PROPERTIES OF GASES, LIQUIDS AND SOLIDS, Symposium on Thermal Properties; ASME and McGraw-Hill Book Company, Inc., N.Y.; $12.50. This volume brings together 42 papers grouped in special areas within the broad field of thermal properties research. Sessions I and II survey the present theoretical and experimental state of the science and also indicate the wide gaps and paucity of knowledge that exists, in both transport and thermodynamic properties, particularly at high temperatures and pressures.

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An exclusive *TRANTER advancement
in heat transfer technology

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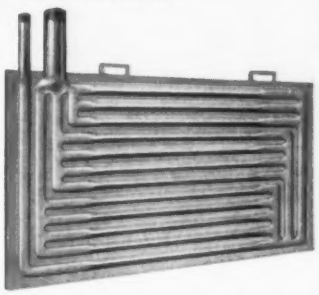
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The new MULTI-ZONE PLATECOIL features a multiple header configuration for improved steam distribution. The resulting increase in effective heat transfer area provides a built-in reserve capacity to deliver more heat during "start-up." It also speeds temporary recovery after introduction of work loads or processing ingredients for closer process control. Decreased condensate "trapping" produces FREE-FLO action.



OPERATING PRESSURES OF 250 psi now make it possible to apply the cost-cutting advantages of PLATECOIL to a new range of heat transfer problems. DURAWELD construction with TRANSTEEL mill-controlled mild steel provides a safety factor of 4 to 1 at 250 pounds steam.

Replace pipe coils with the new MULTI-ZONE PLATECOIL and save on tank space, fabricating, installation and maintenance costs. Factory-fabricated PLATECOIL is available in a wide variety of sizes and styles including single embossed, double-embossed, banked and rolled units in TRANSTEEL, Stainless, Carpenter 20, Monel, Hastelloy C and Nickel.

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for complete specifications and data.



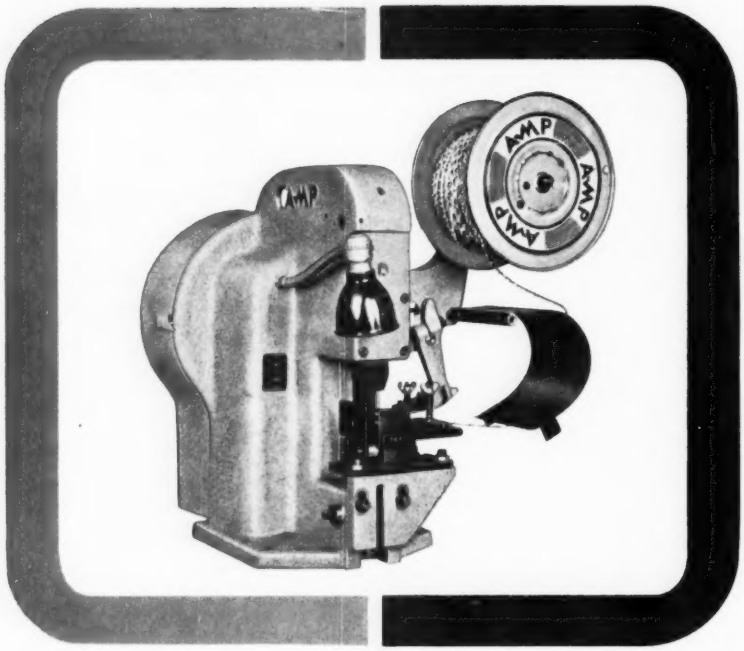
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Additional papers present a large amount of new data and discuss new and improved experimental and theoretical techniques. Several of these papers also review and evaluate the present state of knowledge in the specific areas covered by the papers.

It is interesting to note that this symposium brings seven contributions from Germany, England, and Sweden. More than half of the authors belong to a discipline outside of engineering, indicating the gradual breakdown of the barriers between scientists and engineers.

HANDBOOK OF AUTOMATION, COMPUTATION, AND CONTROL, by Eugene M. Grabbe, Simon Ramo, and Dean E. Woolridge; John Wiley and Sons, Inc., N.Y.; $17.00. Prime purpose of this book is to give continuity to the advancing field of mathematics. It is divided into five sections covering general mathematics, numerical analysis, operations research, information theory and transmission, and feed-back control.

Each chapter is written by a specialist in the field with the assumption that the reader has a good engineering and mathematical background. An excellent bibliography gives both basic and advanced sources for further study. Consulting engineers using computers for solving design problems will find this volume invaluable.

Thomas Weyand
Brender and Brender, Inc.

ROCKET PROPELLANTS, by Francis H. Warren; Reinhold Publishing Corporation, N.Y.; $6.50. With the growing emphasis on rocket engine development and manufacture, consultants are more and more involved in the problem of fuels, either directly or circumferentially. While perhaps too much space is devoted in this book to the subject of some of the more common fuels, it is recognized that a discussion of the more recent developments comes into conflict with security

INCREASED AIR FLOW..... SUPER-QUIET OPERATION!

New Belt Drive "Fiber-Aires" with Bonded Fiberglas Housing*

Available now in 44 belt drive models
plus 17 direct drive units together providing capacities from
180 to 13,500 C.F.M.

Super Quiet

Fiber-Aire's all Fiberglas housing actually absorbs noise and vibration . . . sets a new standard for ventilator quietness.

Adjustable Capacity

Belt drive units feature easily adjustable sheaves . . . capacities are quickly changed, even after installation.

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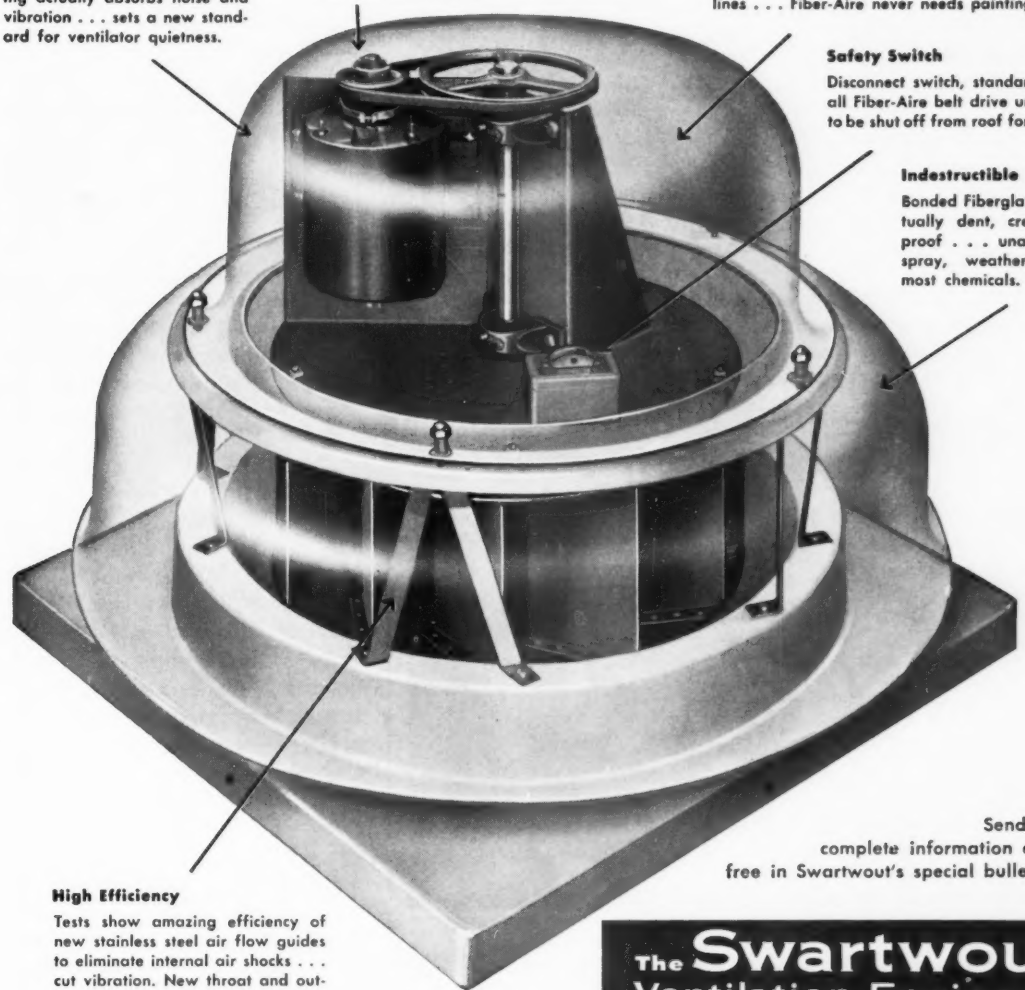
Extra low contour and molded-in sky blue color, that "disappear" against the horizon, never mar clean architectural lines . . . Fiber-Aire never needs painting.

Safety Switch

Disconnect switch, standard equipment on all Fiber-Aire belt drive units, permits unit to be shut off from roof for absolute safety.

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Bonded Fiberglas housing is virtually dent, crack and break proof . . . unaffected by salt spray, weather, fumes, and most chemicals.



High Efficiency

Tests show amazing efficiency of new stainless steel air flow guides to eliminate internal air shocks . . . cut vibration. New throat and outlet designs minimize loss from friction and turbulence.

Send now for
complete information available
free in Swartwout's special bulletin FA-2.

The Swartwout Co.
Ventilation Engineering
18571 Euclid Avenue — Cleveland 12, Ohio

* TM Owens Corning Fiberglas Corporation

In Canada: Eastern Steel Products Ltd. 8 Bermondsey Road, Toronto, Ontario



St. Nicholas Hospital, Sheboygan, Wisconsin

KOHLER ELECTRIC PLANTS

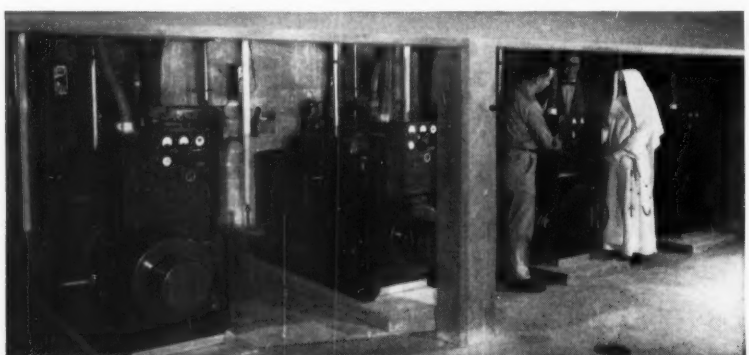
provide protection against power interruptions through 34 years' growth

In 1925, two 1500-watt Kohler Electric Plants were installed in St. Nicholas Hospital, Sheboygan, Wisconsin, as stand-by units to take over critical loads *automatically* when storms or other emergencies cut off regular electricity. Through the years the electric plant installation was expanded as new facilities were added by the hospital.

Today, in a building covering an entire city block, four 50 KW Kohler Electric Plants provide all the electricity needed for uninterrupted patients' care whenever normal power is cut off.

In hospitals everywhere, Kohler Electric Plants insure steady, reliable, unattended power for surgery and delivery rooms, and all other vital hospital facilities. Sizes to 100 KW, gasoline and diesel. Complete manual with suggested specifications sent on request. Write Dept. D-69

• *Kohler installation with two 50R58, 50 KW, 230 volt, 3 phase AC models; and two 50R68, 50 KW, 115/230 volt, single phase AC models.*



KOHLER CO. Established 1873 KOHLER, WIS.

KOHLER OF KOHLER

Enameled Iron and Vitreous China Plumbing Fixtures • Brass Fittings
Electric Plants • Air-cooled Engines • Precision Controls

regulations. However, an adequate presentation of the principles and problems of liquid propellant systems is offered. The author is quick to point out that the space ship of the future may well be propelled by means unknown to the scientific world today.

Daniel Schoenholz
Foster D. Snell, Inc.

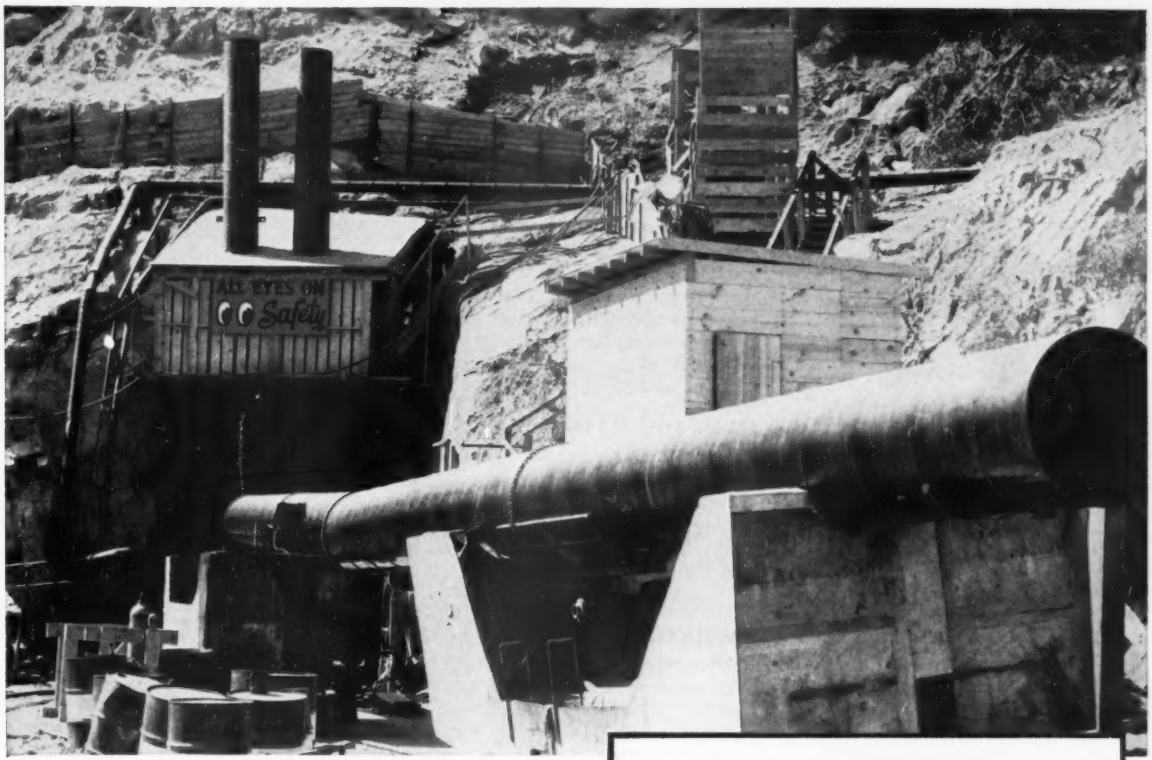
EPOXY RESINS, by Irving Skeist; Reinhold Publishing Corporation, N.Y.; $4.50. This volume primarily is directed to those seeking know-how on the many applications of these versatile resins. The history of the epoxides is developed as a prelude to discussion of the curing or polymerization phase of resin formation. Modifications are covered in detail, as well as the whole range of production problems. The balance of the book is devoted to industrial applications.

S. C. Schwarz
Chemical Engineer

ELECTRONIC CIRCUIT THEORY, DEVICES, MODELS, AND CIRCUITS; by H. J. Zimmerman and S. J. Mason; John Wiley & Sons, N.Y.; $10.75. This is one of several books resulting from the incorporation of the "core curriculum" program in the department of electrical engineering at the Massachusetts Institute of Technology. The purpose of this program is to furnish a common core of instruction for the electrical engineering student providing a broad over-all base of knowledge. Emphasis is placed on basic principles and methods of analysis rather than the ever changing current technology.

This book explains methods of analyzing electronic circuits with stress on the model concept. The character of diodes, triodes, pentodes, transistors, and other electronic devices are synthesized for illustrative purposes. The book has the general format of a text and is, in fact, being used as such. However, for the consulting engineer who would like to be brought up

PIPING SAFETY Into Tunnels

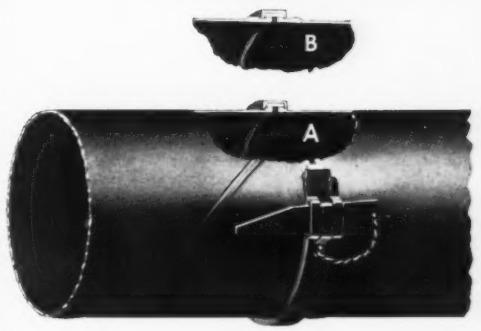


Speaking of safety, you can't go far underground without dependable pipe lines to bring in fresh air and exhaust smoke, gases and fumes.

NAYLOR Spiralweld pipe and Wedgelock couplings provide the ideal combination for ventilating lines in tunnel operations. The pipe is light in weight and easy to handle and install. The spiral-lockseam construction builds in the extra strength needed for push-pull service. And the NAYLOR Wedgelock coupling insures faster installation because connections can be made with only one side of the pipe in the open.

Whether you need pipe for handling ventilation, water or dredging service, it will pay you to consider the advantages of this NAYLOR combination.

Write for Bulletin No. 59



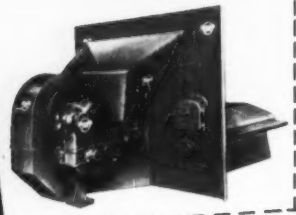
The NAYLOR LOW-PRESSURE WEDGELOCK coupling provides a fast, positive connection. Ideal for ventilating service because it saves space and permits the line to hug the wall. NAYLOR pipe is furnished with (A) accurately-sized shoulder ends or (B) with grooved ends for this advanced-type coupling.

NAYLOR PIPE *Company*

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Eastern U. S. and Foreign Sales Office: 60 East 42nd Street, New York 17, N. Y.

Only CANTON STOKER OFFERS THIS ONE-SOURCE PACKAGE FOR AUTOMATIC COAL HEAT



STOKERS TO FIT THE JOB

Canton Stokers are engineered to job specifications at the factory to serve wide ranges of commercial, institutional, industrial and marine requirements. Capacities range up to 3500 pounds of coal per hour for maintaining loads up to 800 H. P.



CLEAN FUEL HANDLING

Canton Flo-Tube Screw Conveyors move coal to Stokers from bins or piles . . . automatically . . . cleanly . . . dependably . . . economically. They move coal without dust and waste spillage.



BALANCED COMBUSTION

Canton "Synchro" Combustion Controls automatically adjust fuel feed, air supply, boiler draft and combustion rates to steam demand, or to water and weather temperatures.



SMOKE CONTROL

Canton "Turbo-Aire" Systems burn smoke where the smoke begins . . . in the furnace. They enable users to comply with smoke abatement regulations.

For lowest possible fuel and maintenance costs, use this exclusive 4-way Canton Stoker package for making coal firing smoke free and up to 90% automatic. One source . . . one responsibility . . . one guarantee. Mail the coupon today.

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50 YEARS OF PROGRESS

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Please send complete details about your exclusive 4-way system for making coal firing automatic.

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. . . **DEALER FRANCHISES AVAILABLE** . . .

to date in the field of electronics without studying the finite details required for design problems, this book will serve the purpose well.

INDUSTRIAL BUILDING DETAILS, by Duane F. Roycraft; F. W. Dodge Corp., N.Y.; $12.75. This the second edition of a book originally titled *Modern Industrial Construction* and the change in titles is most fortunate. It is a valuable reference source for the consulting engineer who is actively engaged in the planning and design of all types of industrial structures.

Every industrial building detail from walls, windows, door frames, and stairs to time clock alley is included, drawn precisely to scale. A key to symbols and abbreviations, and a master index make each item in the book instantly available. The author is an architect now practicing in Detroit, Michigan.

SIMPLIFIED PROBLEMS IN STRENGTH OF MATERIALS AND STRUCTURAL DESIGN, by Ephraim Viertels; Arco Publishing Co., Chicago; $5.00. In the preface the author states, "The object of the text is to provide an easy, practical, and comprehensive review of the mechanics of engineering fully covering all the subjects as may be found in any college engineering textbook on structural problems and design." This he does.

SYMBOLIC LOGIC AND INTELLIGENT MACHINES, by Berkeley; Reinhold, N.Y.; $6.50. As in his previous books, Berkeley again furthers his contention that machines can think. And, once again, despite the fact that he does a magazine editor out of a job on pages 94-96, his approach is most interesting. While the thought of turning an editor on and off with a button is somewhat disturbing, one is intrigued by the thought of applying the Rules of Logic to the basic premise that machines can reason. For the consulting engineer who desires to

9 years of field service prove safety and long life of Fatigue-resistant USS Tiger Brand Boom Support Assemblies



Nine years ago, American Steel & Wire Division introduced a *fatigue-resistant* Tiger Brand Wire Rope Boom Support Assembly. It was designed to combat the severe vibration on power shovels, draglines and cranes. Since then, it has been installed on thousands of machines with outstanding success.

Effectively dampens vibration. The spliced section gradually dampens vibration instead of concentrating it at one point. This results in greater safety and *much longer cable life.*

Visibility increases safety. With this construction, inspection is easy and the development of broken wires is readily detected. They are not hidden in a shank or socket basket. Thus, you can tell when to replace the assembly in time to prevent accidents.

Easy application. There's no need for extensive alteration of your present equipment. Tiger Brand Wire Rope Boom Support Assemblies are made with standard-size fittings. These are completely interchangeable on standard equipment. For further information, contact our nearest office or write American Steel & Wire, Dept. 9224, 614 Superior Ave., N. W., Cleveland 13, Ohio.

USS and Tiger Brand are registered trademarks



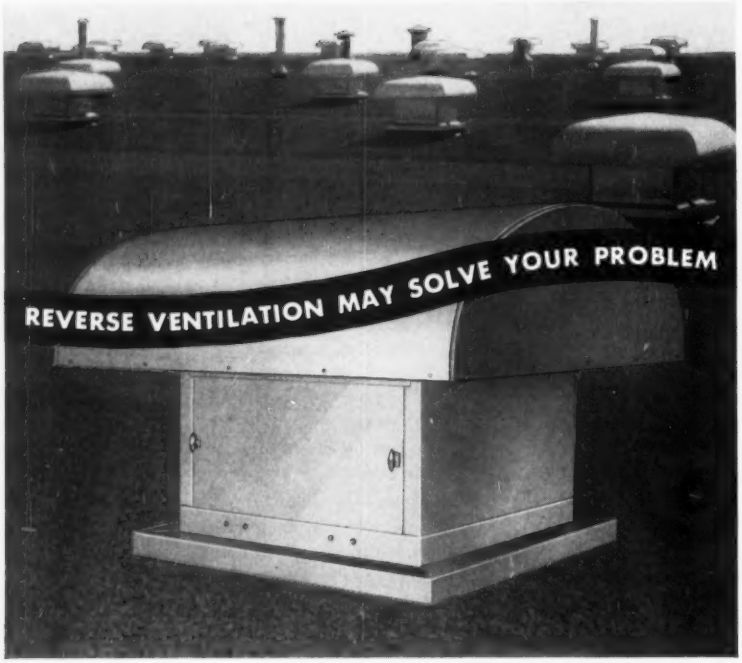
Greater safety—20% longer service life was obtained from these Tiger Brand Boom Support Assemblies used on a crane owned by the Hunkin & Conkey Construction Co. in Ohio.

Vibration is effectively dampened by these Tiger Brand Boom Pendants with spliced ends. The splice can be readily inspected for broken wires—an added safety factor.

American Steel & Wire Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Alabama, Southern Distributors
United States Steel Export Company, Distributors Abroad

For the U.S. Army Missile Master—



Burt Low Type Ventilators, Supply and Exhaust Air for Aluminum Co. of America

Blow Down Fresh Air to Blanket Floor Area

Wide, low-roofed, modern single-story plants are often difficult to ventilate properly with conventional methods. Perimeters are comfortable but other areas may not be.

Aluminum Company of America's new Screw Machine Products Plant at Lancaster, Pa., with neither cross ventilation nor natural ventilation, solved this problem with "reverse" ventilation. Forty-nine 48" all-aluminum Burt Low Type Roof Ventilators maintain a year-round pleasant working atmosphere.

Twenty-five of the Burt Ventilators operate in **reverse** to blow a blanket of fresh air over the entire working floor. Adjustable diffusers circulate the air at floor level to meet seasonal needs. Strategically located over various hot areas, these Burt supply ventilators need no long horizontal duct runs to reach air intakes on outside walls.

The other twenty-four Burt ventilators exhaust the considerable heat and oil mist from production operations.

The cost of these Burt units was less than one-fourth that of a centralized duct system.

For fresh air at low cost in your plants, why not investigate Burt's complete line of modern, efficient roof ventilators now!



Send for **FREE** *Data Book!*

Write for Burt Data Book SPV-101-G. It supplies quick data on Burt's complete line of modern Roof Ventilators.

FAN & GRAVITY VENTILATORS • LOUVERS • SHEET METAL SPECIALTIES

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MEMBER AIR MOVING & CONDITIONING ASSOCIATION, INC.

know more about the giant automatic computers and their increasing use in the engineering field, this book adequately describes the "application of symbolic logic in the design of machines that behave intelligently."

The four chapters on Boolian Algebra, sometimes called the "algebra of language" are extremely informative.

WATER FACTS FOR THE NATION'S FUTURE, by W. B. Langbin and W. G. Hoyt; Ronald Press Co., N.Y.; $5.00. Because of the growing importance of the water problem and its political impact, especially in the western states, there will be a natural tendency among consultants to read more into this title than they should. This is a book about water facts; what they are, how they are obtained, and how they are used. It is a lucid, well organized argument that more data must be obtained and better applied before the greater problem of enough water for every person and every job can be worked out intelligently. While there is a great mass of detail available and continuing to be recorded, it is not always pertinent or, when pertinent, properly used. In addition, the authors provide a comprehensive analysis of the current hydrologic programs both Federal and state and the specific steps necessary to implement a program of intelligent management of our water resources.

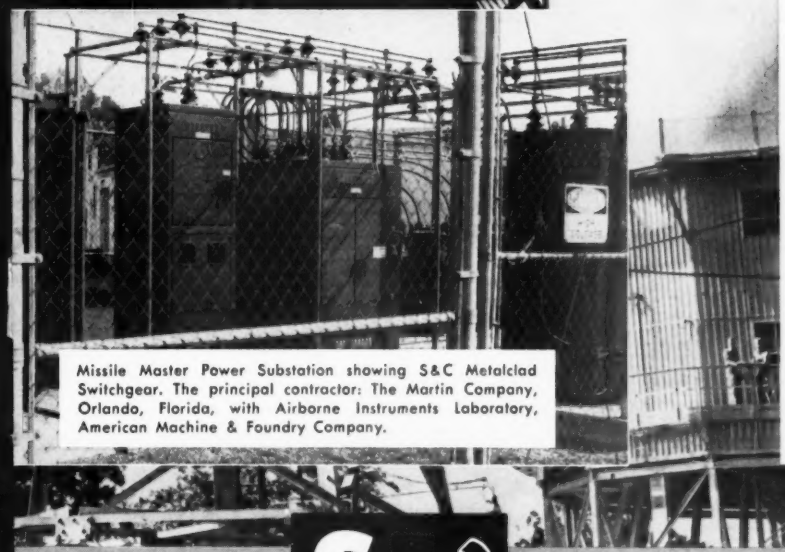
Both authors are water management experts of wide experience; Walter B. Langbin, serving as an hydraulic engineer associated with the U.S. Geological Survey for most of his professional life, and William G. Hoyt, serving as a consulting hydraulic engineer on several state and Federal survey teams and more recently as the executive officer and vice chairman of the Water Resources Committee, Department of the Interior. The book is sponsored by the Conservation Foundation. ▲▲

For the U.S. Army Missile Master—

Where Reliability is a Command:—

S&C Metalclad Switchgear is used on the primary power supply





Missile Master Power Substation showing S&C Metalclad Switchgear. The principal contractor: The Martin Company, Orlando, Florida, with Airborne Instruments Laboratory, American Machine & Foundry Company.

At Fort George G. Meade, Maryland, this vital electronic installation collects information on the location of aircraft, presents this information on displays for decision, and then distributes selected data to NIKE missile batteries in a large defense area. The high-voltage power supply for the radar and electronic devices uses S&C Metalclad Switchgear for primary protection and switching.

Specified as part of this ultra-reliable nerve center of the Nation's defense are S&C Metalclad Switchgear units, using Power Fuses and Load Interrupters. See inset, left.

Such installations will be used in many areas throughout the United States, where NIKE installations protect population and industrial centers.

For further information about S&C Metalclad Switchgear, write to S&C Electric Company, 4456 Ravenswood, Chicago 40, Ill.

Specialists in High-Voltage Circuit Interruption for Utilities Since 1910

S&C

METALCLAD SWITCHGEAR

Underfloor Electrification isn't NEW...
But it's NEWS when a quality system offers big savings so any building "can afford" electrification

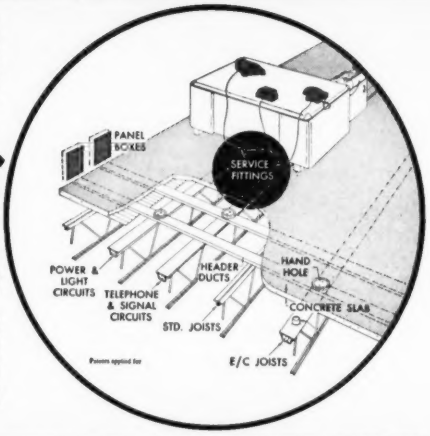




This construction view shows the clean arrangement of header ducts installed on Ceco E/C Joists. These header ducts were installed quickly and economically by an electrical crew which had never before installed a system of underfloor electrification.

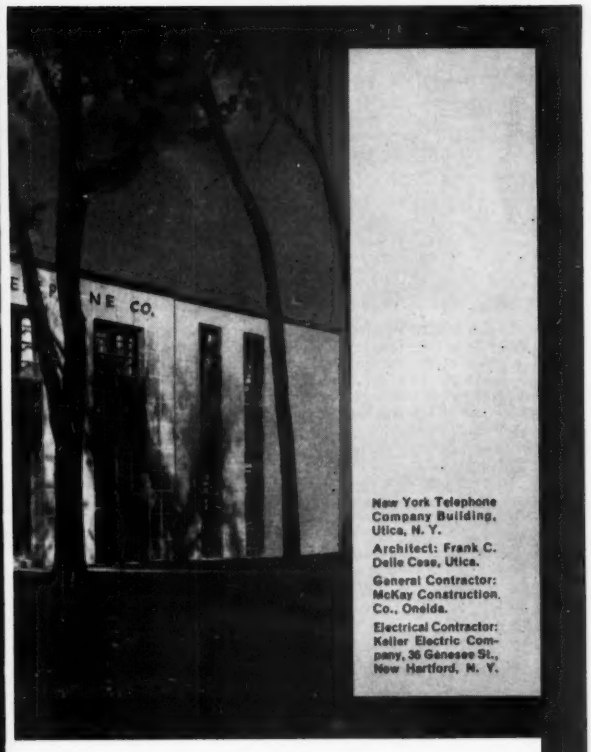
Electrical, telephone and signal wires are run from the panel boxes down through the header ducts, into the top chord of the E/C Joist and up through the service fittings to desks located anywhere on the floor. Whenever desks are moved, the fittings can be installed anywhere along the joists to service the new positions.

The E/C Joist system is listed by Underwriters' Laboratories for use with standard header ducts and electrical accessories manufactured by General Electric Co., National Electric Division of H. K. Porter Co. (formerly Nepco) and Walker Bros. of Conshohocken.



TOTAL MANUFACTURING FOR THE BUILDING INDUSTRY FROM RAW TO FINISHED PRODUCTS

CECO'S E/C JOIST SYSTEM OF UNDERFLOOR ELECTRIFICATION ASSURES QUALITY WITH ECONOMY



New York Telephone Company Building, Utica, N. Y.
Architect: Frank C. Delle Cese, Utica.
General Contractor: McKay Construction Co., Oneida.
Electrical Contractor: Keller Electric Company, 36 Genesee St., New Hartford, N. Y.

When a building method offers quality at a cost lower than any competing system, that's a combination hard to beat.

Add to that down-to-earth practicality, plus design that satisfies the future . . . then you can specify with confidence.

Such is Ceco's E/C Joist system of underfloor electrification. Savings are realized because Ceco's E/C Joists do two jobs: 1—provide raceways for underfloor electrification; 2—carry the floor load. Now any building "can afford" underfloor electrification.

These advantages of Ceco's E/C Joist system were proved in the Utica, New York Telephone Company office building.

The architect specified Ceco's E/C Joist system and a commonly used alternate. The successful bidder's figures showed the Ceco system saved 56c per square foot compared with the alternate. Read what those concerned have to say:

Owner, Milton A. Abelove and Daniel B. Myers:
"The E/C Joist system satisfied our requirements of avoiding electrical obsolescence for years to come, and we saved a considerable amount of money."

General Contractor, John T. McKay:
"The savings shown in the bids were proven on the job by the Ceco E/C Joist system. I would like to erect more buildings using the same system."

Electrical Contractor, Reginald Keller:
"Installation of the E/C Joist system was practical. Our workmen were able to install it economically, even though they had never installed underfloor electrification using header ducts."

On your next job specify the Ceco E/C Joist system. Send for the facts now. Mail the handy coupon today. Ceco Steel Products Corporation. Sales offices, warehouses and fabricating plants in principal cities. General offices: 5601 West 26th Street, Chicago 50, Illinois.

CECO STEEL

IN CONSTRUCTION PRODUCTS CECO ENGINEERING MAKES THE BIG DIFFERENCE . . . Steel Joists / Steelforms / Concrete Reinforcing / Curtainwalls, Windows, Screens, Doors / Cecoframe Buildings / Roofing Products / Metal Lath

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Please send the following technical literature:
☐ E/C Joist Manual #3011-A ☐ Steel Joist Catalog #3001-O ☐ Joist Load Tables #3009

name_____
position_____
firm_____
address_____
city_____ zone____ state_____
☐ If student, check here for special data.

In water and sewage works across the continent...

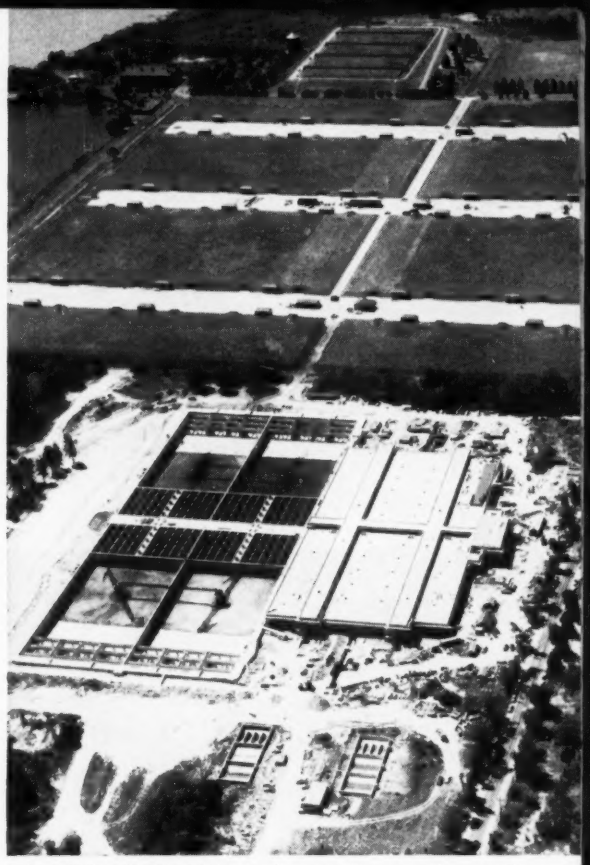
Where there's progress...there's POZZOLITH concrete

The men who design and build modern facilities like these know that concrete used in water and sewage plants must withstand severe weathering, wear and corrosive action. That's why they confidently specify and use concrete produced with POZZOLITH . . . for up to 400% greater durability—reduced shrinkage and less cracking—and up to 80% lower permeability. All this adds up to longer, "maintenance-free" concrete life.

POZZOLITH is time-tested and proved. The hundreds of water and sewage works built with POZZOLITH concrete over the past 25 years are evidence that POZZOLITH concrete is superior in performance, in quality, and in economy to plain concrete and to concrete produced with any other admixture.

For case histories of projects—in your area and across the nation—write for the Master Builders "Water and Sewage Works Reporter". On current or future jobs call in your Master Builders field man. He'll welcome the opportunity to discuss your requirements.

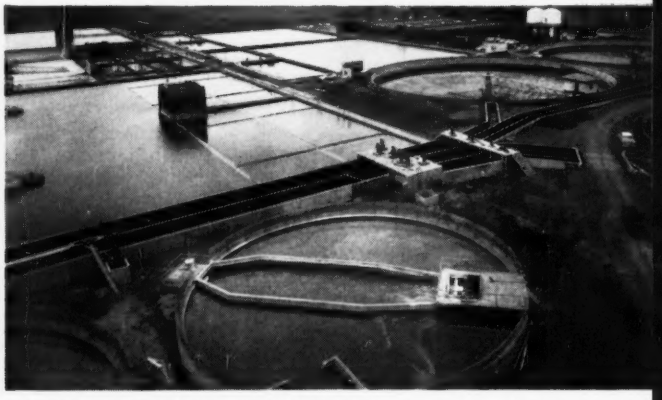
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Division of American-Marietta Company
The Master Builders Company, Ltd., Toronto 15, Ontario
International Department, New York 17, New York
Branch Offices in all principal cities.



TORRESDALE FILTER PLANT—built under the supervision of the Philadelphia Water Dept., Comissioner & Chief Engineer, S. S. Baxter • Architect: Antrim & Etter, Philadelphia • Engineer: Morris Knowles, Inc., Pittsburgh • Contractors: McCloskey & Co. and Hughes-Foulkrod Co., Philadelphia • POZZOLITH Ready-Mixed Concrete: Liberty Corp. and The Warner Co., Philadelphia.



HUMBER SEWAGE DISPOSAL PLANT—Toronto, Ontario • Architect: D. E. Kertland, Toronto • Consulting Engineers: James F. MacLaren Association, Toronto • Associate Engineers: Alvord, Burdick and Howson, Chicago • Contractor: Pigott Construction Co., Inc., Toronto.



KANSAS CITY WATER SOFTENING PLANT—Kansas City, Missouri • Engineers: Burns & McDonnell Engineering Co. and Black & Veatch Engineering Co. • Construction: S. Patti Construction Co., all of Kansas City.

MASTER BUILDERS®
POZZOLITH*

**POZZOLITH is a registered trademark of The Master Builders Co. for its concrete admixture to reduce water and control entrainment of air and rate of hardening.*



New Projects Reported

By Consulting Engineers

ALABAMA

J. W. Goodwin Engineering Company
Birmingham, Alabama
¶ Approximately 33 miles of 60-in. I. D. steel pipe in Jefferson County, Alabama, running from Sipsey Fork of Warrior River to Birmingham, to supply 75 mgpd of industrial water. (preliminary surveys, design, and supervision of construction) $23 million. Client, Birmingham Industrial Waterworks Authority.

ARIZONA

F. B. Pacheco Company and Landmark Engineering
Tucson, Arizona
¶ Plans and supervision of construction of 200 fire hydrants. (civil) $9000. Client, City of Tucson, Arizona.

CALIFORNIA

Mackintosh & Mackintosh
Los Angeles, California
¶ The Plush Horse Inn, Redondo Beach, California. (struc.) $500,000. Client, Sam Reisbord, architect, S. Jon Kreedman & Company, contractors.
¶ Five-story office building on Wilshire Boulevard, Los Angeles, California. (struc.) $1 million. Client, Sidney Eisenshtat & Associates, architects, S. Jon Kreedman & Company, contractors.

Ruth & Going
San Jose, California
¶ Concrete batch plant, Santa Clara County, California. (struc., civil) $100,000. Client, Western Gravel Company.
¶ Stores and apartments, Modesto, California. (struc., civil) $1 million. Client, Randy Development Company.
¶ Dutch Boy paint store, Modesto, California. (struc., civil) $55,000. Client, Larry Meeker.
¶ Factory and administration building, San Jose, California. Concrete tilt-up construction, plywood panelized roof system, glued-laminated roof girders. (struc.) $350,000. Client, Economics Laboratories. Architect, Han G. Glass.
¶ Civic center site improvements. (struc., civil) $300,000. Client, County of Santa Clara, California.

Pomeroy and Associates
Pasadena, California
¶ Design secondary sewage treatment and sludge digestion facilities, and redesign certain trunk sewers. (civil) Trunk sewers $650,000; new treatment plant, $500,000. Client, City of Palm Springs.

Wilsey and Ham, Engineers and Planners
Millbrae, California
¶ Conduct routing and public utility location studies and develop cost estimates for San Mateo County segment of a rapid transit system to serve the San Francisco Bay area. $45,000. Client, Bay Area Rapid Transit District.

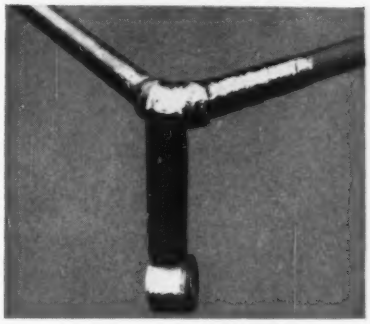
COLORADO

Ib Falk Jorgensen
Denver, Colorado
¶ United Air Lines training center, Denver, Colorado. (struc.) $2.5 million. Client, E. A. Francis, architect.
¶ Student union building, Colorado State University, Fort Collins, Colorado. (struc.) $2.5 million. Client, J. M. Hunter, architect.
¶ Science building, Adams State College, Alamosa, Colorado. (struc.) $800,000. Client, J. T. Wilson, architect.
¶ Continental Divide Motor Raceway, race track, Castle Rock, Colorado. (civil) $250,000. Client, H. C. Toll, architect.

CONNECTICUT

Loomis & Loomis
Windsor, Connecticut
¶ Trinity Methodist Church, Windsor, Connecticut. (struc.) $165,000. Client, C. F. Bayek, architect.
¶ Daniel Hand school, Madison, Con-

For True Economy...
MEASURE PIPE PROTECTION WITH A CALENDAR!



Why Engineers Specify TAPECOAT ...The Quality Coal Tar Protection in Handy Tape Form for

Pipe	Tanks
Pipe Joints	Insulated Lines
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Fittings	Sprinkler Systems
Conduit	Bridge Crossings
Cables	Tie Rods

. . . in underground or under-water service

Since 1941, TAPECOAT coal tar coating in tape form has proved itself the best possible protection at lowest possible cost. Pipe and other surfaces TAPECOATED 17 years ago show no signs of deterioration—a record unmatched by any other type of tape.

Field application costs are lower with TAPECOAT because it is so easy to apply with the use of a torch. No tar kettles, technical know-how or special crews are required. TAPECOAT comes in rolls of 2″, 3″, 4″, 6″, 18″ and 24″ widths—sized to the job.

A TAPECOAT sales and service engineer is available at all times to assist you on any corrosion problem and on the various applications of TAPECOAT.

Write for illustrated brochure.

The **TAPECOAT** *Company*

Originators of Coal Tar Coating in Tape Form

1569 Lyons Street
Evanston, Illinois

Representatives in Principal Cities
Manufactured and Distributed in Canada by
The Tapecoat Company of Canada, Ltd.
25 Haas Road, Rexdale, Ontario

Good Pair to Know!

Chances are you won't have to look far to find a spot for one of these float-operated switches.

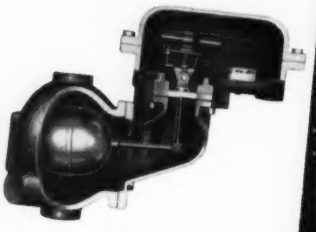
They have been specially developed by McDonnell to serve two broad fields of application. They answer a lot of operating problems that you may have thought could be handled only by make-shift or much more expensive equipment.

Dependable and time tested, they are just two of hundreds of products developed by McDonnell for liquid level or liquid flow control. When you choose from the complete McDonnell line it's good to know you draw on unmatched experience and know-how in this specialized field.

McDonnell No. 65
Explosion Proof Electric Controller

Underwriters' Listed for use in hazardous locations:
Class 1, Group C & D
Class 2, Group F & G

A float-operated switch for use under hazardous conditions, such as atmospheres containing butane, benzol, lacquer solvent, alcohols, acetone, coal and grain dust, etc. Can be furnished to make or break electric circuit at high- or low-level — to control motors, signal lamps, electric elements, etc. Suitable for internal pressures up to 40 psi.

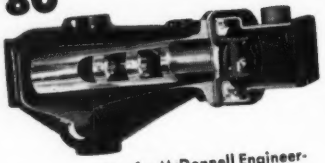


Write for McDonnell Engineering Bulletin ERS-10 which discusses typical applications of No. 65, shows wiring diagrams for different patterns of operation.

McDonnell No. 80
High- or Low-Level Switch

Underwriters' Listed for use on oil tanks.

A float-operated three-terminal switch that can be used to provide high- or low-level alarm, or to start or stop a pump when level rises or falls. It makes possible reliable automatic control in place of gauge glass watching and manual control.



Write for McDonnell Engineering Bulletin ERS-9 which shows typical application of No. 80 on oil storage tanks, complete with wiring diagrams for draining or filling tanks, high- or low-level alarm, signal or cut-off.

Write for complete literature and engineering bulletins.

McDONNELL & MILLER, *Inc.*, 3500D N. Spaulding Ave., Chicago 18, Ill.

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REG. U. S. PAT. OFF. SAFETY CONTROLS

Your Jobber Stocks Them

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BOILER WATER FEEDERS • LOW WATER FUEL CUT-OFFS • PUMP CONTROLLERS • RELIEF VALVES • FLOW SWITCHES • RELATED LIQUID LEVEL CONTROLS FOR TANKS, STILLS, AIR CONDITIONING SYSTEMS

necticut. (struc.) $740,000. Client, Wilkins & Steckor, architects.
¶ Shoreham Motor Hotel, Hartford, Connecticut. (struc.) $1.2 million. Client, Kane & Fairchild, architects.
¶ Silver Lane bowling alleys, East Hartford, Connecticut. (struc.) $270,000. Client, Kane & Fairchild, architects.
¶ Meadow Lanes bowling alleys, Hartford, Connecticut. (struc.) $270,000. Client, Elroy Webber, architect.

FLORIDA

M. J. Alfonso
Tampa, Florida
¶ Police station for City of Tampa, Florida. (mech., elec.) $1.5 million. Client, I. A. DeMinicis, architect.
¶ Project for H. L. Green at Lake Wales, Florida. (mech., elec.) $400,000. Client, R. E. Sessen, architect.
¶ Project for Hillsborough County Board of Health, Tampa, Florida. (mech., elec.) $25,000. Client, Hillsborough County Board of Commissioners.
¶ Medical clinic located at Tampa, Florida. (mech., elec.) $50,000. Client, I. A. DeMinicis, architect.

IDAHO

Arthur Tiggelbeck
Sandpoint, Idaho
¶ Forty blocks of grading, curbing, and paving, City of Sandpoint, Idaho. (civil) $200,000. Client, City of Sandpoint.

ILLINOIS

Harry H. Cordes, Consulting Engineers
Rockford, Illinois
¶ Bridge structure, Paradise Township, Coles County, Illinois. (struc.) $62,943. Client, V. I. Dodson & Associates, Consulting Engineers, Mattoon, Illinois.
¶ Rehabilitation of Sugar Island Bridge, Kankakee County, Illinois. (struc.) $26,636. Client, Kankakee County.
¶ Bridge structures, Denning Township, Franklin County, Illinois. (struc.) $138,100. Client, Roy Vinyard, Consulting Engineer, Benton, Illinois.
¶ Precast concrete bridge structure, Piatt County, Illinois. (struc.) $20,166. Client, Piatt County.

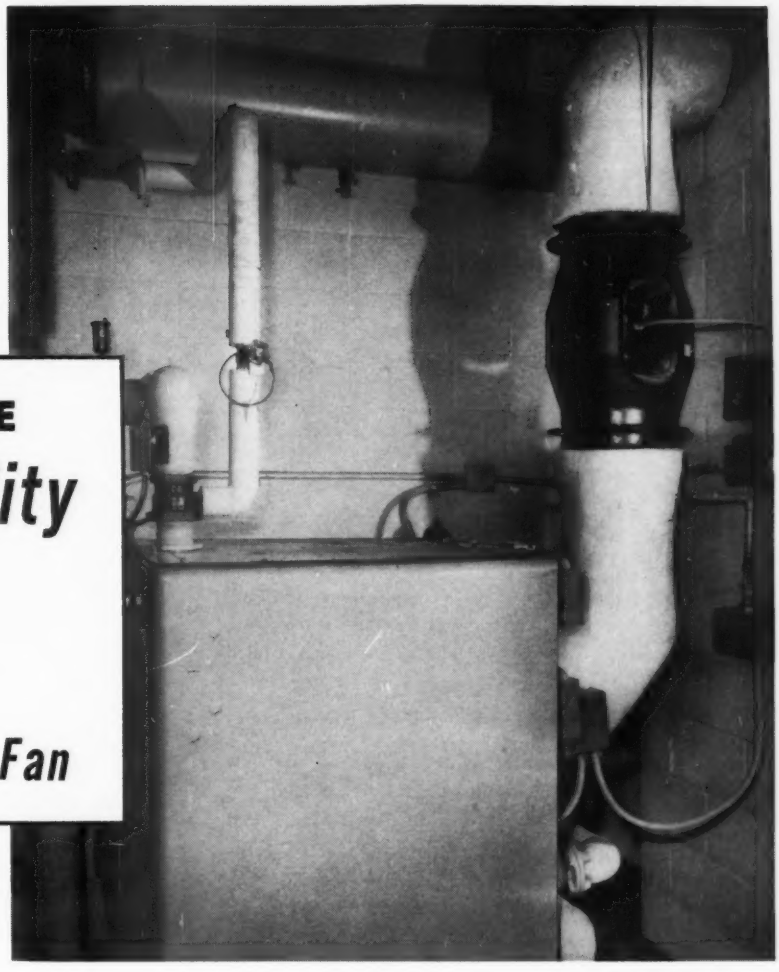
William T. Hooper
Lake Forest, Illinois
¶ Street improvements, Zion, Illinois. (civil) $778,820. Client, City of Zion.
¶ Underground improvements, sanitary trunk and sanitary relief sewers, Zion, Ill. (civil) $202,683. Client, City of Zion.

INDIANA

J. B. Wilson & Associates
Indianapolis, Indiana
¶ Industrial waste treatment system for poultry processing plant, Washington, Indiana. (civil, struc., mech., elec.) Client, Graham Farms, Inc.
¶ Waterworks improvements, Mitchell, Indiana. (civil, struc., mech., elec.) $500,000. Client, City of Mitchell, Indiana.
¶ Iron removal system, Dublin, Indiana.



THIS IS WHERE *dependability counts for Induced Draft Fan*



DeBothezat Induced Draft Bifurcator Fan with motor speed controller installed in unattended AT&T radio relay tower.

This installation of a DeBothezat Induced Draft Bifurcator® is typical of numerous others in unattended radio relay towers of the American Telephone and Telegraph Company. A dependable, controlled draft helps maintain correct temperatures that safeguard the performance of sensitive electronic equipment.

This Induced Draft Fan utilizes a direct motor drive which eliminates any chance for belt failure. The fan motor mounts in a separate insulated chamber and hot flue gases are bypassed around it.

DeBothezat Induced Draft Bifurcator Fans install just like a section of breeching or duct-work. This saves on space and installation costs.

Bifurcators can be equipped with motor speed controllers which regulate draft according to exact boiler requirements.

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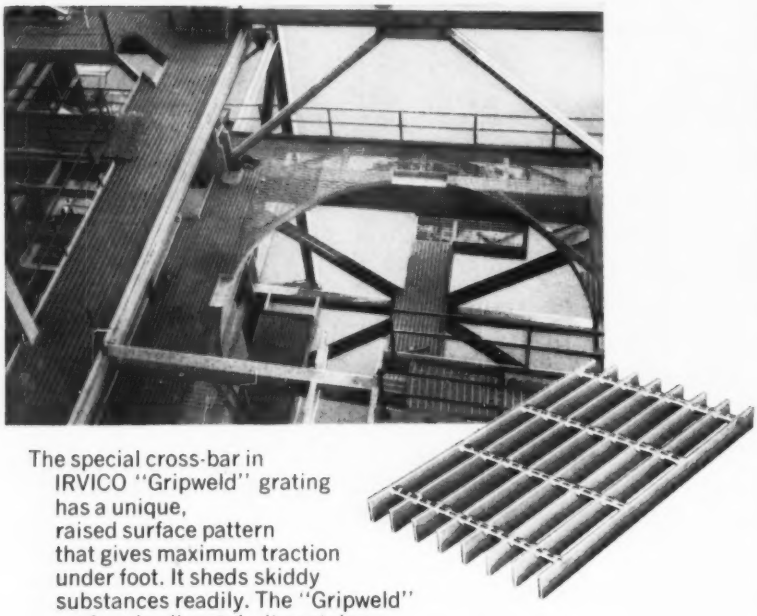
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means

- **Extra Safety Under Foot**
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The special cross-bar in IRVICO "Gripweld" grating has a unique, raised surface pattern that gives maximum traction under foot. It sheds skiddy substances readily. The "Gripweld" surface is all metal—it contains no sandy or gritty material that may become dangerously packed with oil or grease.

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ORIGINATORS OF THE GRATING INDUSTRY

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5056 27th ST., LONG ISLAND CITY 1, N. Y.
1856 10th ST., OAKLAND 10, CALIFORNIA

(civil, struc., mech., elec.) $20,000. Client, Town of Dublin, Indiana.

¶ Iron Removal system, Tell City, Indiana. (civil, struc., mech., elec.) $60,000. Client, City of Tell City, Indiana.

¶ Belmont interceptor, Indianapolis, Indiana. (civil) $300,000. Client, City of Indianapolis, Indiana.

¶ Ben Davis Conservancy District, Indianapolis, Indiana. (civil, struc., mech., elec.) $3.2 million. Client, Ben Davis Conservancy District.

KANSAS

Spears and Tatum
Mission, Kansas

¶ Plans, specifications, and FAA reports for Kirksville Municipal Airport, Kirksville, Missouri. $200,000. Client, Kirksville Municipal Airport.

K. E. Rector & Associates
Topeka, Kansas

¶ Barton County, highway east and west of Claflin. (civil) $280,000. Client, Kansas Highway Commission.

¶ Sanitary sewer project No. 224. (civil) $50,000. Client, City of Topeka, Kansas.

¶ Sanitary sewer project No. 252. (civil) $60,000. Client, City of Topeka, Kansas.

¶ Jackson County, highway south of Mayetta. (civil) $290,000. Client, Kansas Highway Commission.

KENTUCKY

M. C. Welch
Lexington, Kentucky

¶ Lansdowne subdivision, south of Lexington, Kentucky on Tates Creek Pike. 300,000-gpd activated sludge type sewage treatment plant. (civil, struc., mech., elec.) $175,000; 350-gpm sewage lift station. (civil, struc., mech., elec.) $11,000; 250-gpm sewage lift station. (civil, struc., mech., elec.) $10,000; and sanitary sewers and force mains. (civil) $130,000. Client, C. B. McEachin and J. W. Davis, Jr., developers.

¶ Brigadoon subdivision and Blueberry Hill subdivision, south of Lexington, Kentucky. 175,000-gpd standard rate filter sewage treatment plant. (civil, struc., mech., elec.) $125,000; sanitary sewers, (civil) $120,000. Client, Brigadoon-Blueberry Sanitary Disposal Corporation.

¶ Gainesway subdivision, Lexington, Kentucky. Sanitary sewer extension. (civil) $155,000. Client, Terrafirma, Inc., developers; City of Lexington, owner.

¶ Camp Powderhorn (Boy Scouts of America), Boone County, Kentucky. 25-gpm water treatment plant. (civil, struc., mech., elec.) $18,000. Client, G. M. Baker & Son, Inc., Columbus, Ohio.

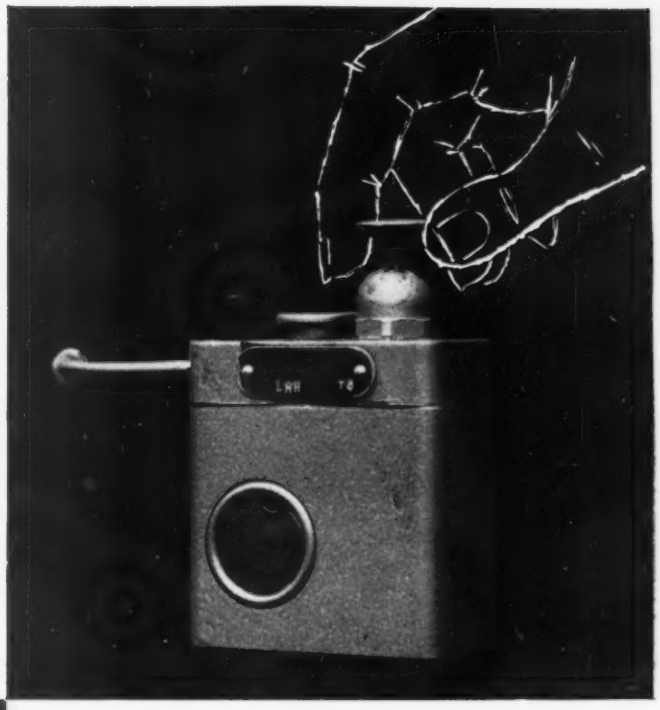
LOUISIANA

Irving B. Rau
New Orleans, Louisiana

¶ Westgate elementary school, Kenner, Louisiana. (struc.) $198,000. Client, George Ducorbier, arch., New Orleans

¶ East Houma elementary school, Houma, Louisiana. Lift slab roof. (struc.) $308,-





Another *Quality First* for Marlo

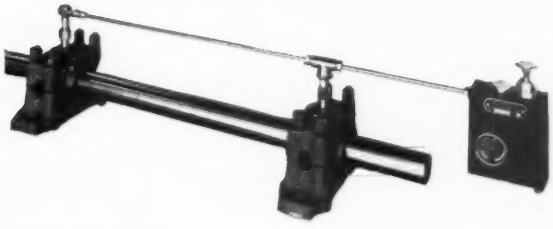
THE SIMPLE PULL OF A PLUNGER LUBRICATES ALL BEARINGS SIMULTANEOUSLY ON AIR CONDITIONING AND REFRIGERATION EQUIPMENT

Centralized lubrication, used extensively on the finest machine tools, is now applied to air conditioning and refrigeration equipment for the first time.

On all Marlo sleeve-bearing units, a single operation—the simple pull of a plunger—shoots a measured amount of lubricant at 30 psi to every bearing simultaneously. Maintenance is simplified and reduced, guesswork and human error eliminated. And because the system is sealed and filter-equipped, no foreign matter can reach bearings.

Reservoir equipped with oil level sight glass has a capacity of 60 or 150 cc of lubricant (depending on size of the Marlo unit)—enough for 60 or 75 "shots".

Specify Marlo units equipped with a closed forced feed lubrication system, metering oil to each bearing from a central lubrication point with oil reservoir and sight glass.

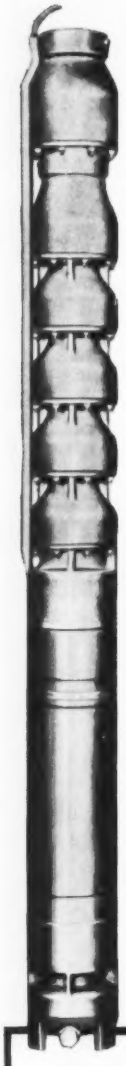


Marlo coil co.

SAINT LOUIS 11, MISSOURI

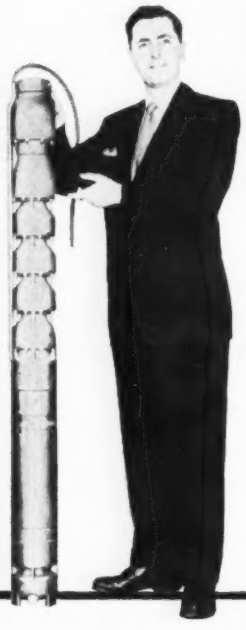
Quality Air Conditioning and Heat Transfer Equipment Since 1925

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For water supply, choose and specify Sumo Submersible Deep Well Pumps

These electrically operated, high capacity pumps are installed directly in the well, completely under water. The entire installation is fast, neat and compact. Sumo Submersibles have been used in installations all over the world. They're completely dependable and designed to operate at highest efficiencies. Sizes from 1/3 hp to 120 hp with capacities up to 1500 gpm.



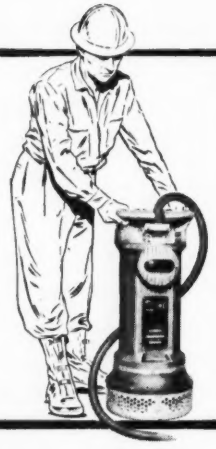
Engineering Assistance Sumo's nationwide pumping experts are ready to assist consulting engineers in problems of selection, application, and installation data. No obligation, of course.

BULLETIN B-1000 has complete details. Send for a copy.



For drainage, dewatering or flooding choose and specify Sumo Submersible Drainer Pumps These 7½ hp electric submersible drainer pumps are designed to pump water containing up to 20% solids. They're sturdy, reliable and can be used either as portable units or permanent installations. They're ideal for construction work, for dewatering mines, flooding compartments; pumping river or canal water.

BULLETIN B-1100 has details. Send for a copy.



SUMO PUMPS INC.

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Sales Representatives in Principal Cities

000. Client, Fernand T. Picou, architect, Thibodaux.

¶ Merchants Trust & Savings Bank, Kenner, Louisiana. (struc.) $105,000. Client, Stoffle & Finger, arch., New Orleans.

MASSACHUSETTS

Joseph L. Paley, Consulting Engineer
Boston, Massachusetts

¶ Reconstruction and extension of Runway 5-23 and construction of relocated Clark Street, Lawrence, Massachusetts. Work includes excavation, filling and backfilling, drainage, piping and structures, duct work, temporary lighting, clearing and grubbing, bituminous concrete pavement, and installation of water line. $700,000. Client, Lawrence Airport Commission.

Loomis & Loomis
Windsor, Connecticut

¶ Wilbraham bowling alleys, Wilbraham, Massachusetts. (struc.) $240,000. Client, Elroy Webber, architect.

MICHIGAN

Edwin M. Orr
Dearborn, Michigan

¶ Wayne County water supply system, Romulus section. $2 million. Client, Wayne County Road Commission.

McNamee, Porter & Seeley
Ann Arbor, Michigan

¶ Marquette, Michigan water works improvements, intake well level recorder, 5-mgd high service pump, venturi tube and meter, booster pumps and station, 1-mm gal. steel reservoir, ground level, main extensions, approximately 17,000 feet of 4-in. to 16-in. mains. (civil) $385,000. Client, City of Marquette.

MINNESOTA

Hitchcock & Estabrook, Inc.
Minneapolis, Minnesota

¶ Power plant, Ah-Gwah-Ching, Minnesota. (civil, struc., mech., elec.) $350,000. Client, State of Minnesota.

¶ Bridge structure at Zumbrota, Minnesota. (civil, struc.) $200,000. Client, State of Minnesota.

¶ Sewage treatment, Litchfield, Minnesota. (civil, struc., mech., elec.) $750,000. Client, City of Litchfield.

¶ Motel located at Pleasant Lake, Minnesota. (civil, struc., mech., elec.) $200,000. Client, Langeson.

NEW JERSEY

Melvin H. Friedman & Associates
Bergenfield, New Jersey

¶ New executive offices, Rayco Corporation, Paramus, New Jersey. 30,000-sq ft alteration of existing building. (mech., elec.) $320,000. Client, Rayco Corp.

Victor J. Lo Pinto Associates
Long Branch, New Jersey

¶ Investigation, design, plans and specifications, bituminous asphalt roads. (civil)

Engineering the temperature...

WITH RECOLD IN THE LOS ANGELES SPORTS ARENA

The new 22,400-seat Memorial Sports Arena establishes Los Angeles as the sports capitol of the nation. Recold units supply over 672,800 CFM of heating and air conditioning for this vast building.



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RECOLD



Designed by: Welton Becket & Associates, Architects & Engineers
Air-Conditioning Installed by Western Air & Refrigeration, Inc.



In Dust Collection Systems...



SF Precipitator at a steel plant.

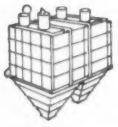
design makes the difference

Higher efficiency of Buell 'SF' Electric Precipitators is the result of exclusive engineering features. For example, Buell's *Spiralectrodes* emit 50% to 100% more electrons than other types . . . and *maintain* their efficiency. Positive gas flow control through adjustable baffles prevents scouring and eddying. And Buell's Unique Continuous Cycle Rapping practically eliminates "puffing".



BUELL CYCLONES

Lower installation cost of Buell's time-proved simplified design makes erection faster and easier. Spiralectrodes, for example, are self-tensioning, require no weights. Flexibility of power supply means easier installation, operating safety.



"SF" ELECTRIC PRECIPITATORS

Lower maintenance cost is the result of many details of superior design. And sectionalized design permits shutting down part of a unit without interrupting service in the rest of the unit.

Get full information: write for a copy of "Buell SF Electric Precipitators", a 22-page booklet. Write to Dept. 47-I, Buell Engineering Co., Inc., 123 William Street, New York 38, N. Y.



PRECIPITATOR-CYCLONE COMBINATIONS

buell®

Experts at delivering Extra Efficiency in

DUST COLLECTION SYSTEMS

$47,500. Client, U.S. Navy, Naval Ammunition Depot, Earle, New Jersey.

Maiman Associates
Valley Stream, Long Island, New York
¶ High View Towers apartments, Hackensack, New Jersey. (struc.) $3 million. Client, Goodman.
¶ Harrison Gardens, Hoboken, New Jersey. (struc.) $5 million. Client, Hoboken Housing Authority.

NEW YORK

Charles N. & Selig Whinston
New York, New York
¶ Two-story factory and office, Borough of Queens, New York. (struc., mech., elec.) $500,000. Client, Wm. Intner Co.

P. Anthony Sarubbi, P.E.
Yonkers, New York
¶ Addition to St. John's Evangelical Church, Yonkers, New York. Structural design includes open web steel joists, insulated precast plank, structural steel framing, concrete foundations. (civil, struc.) $175,000. Client, M. A. Capobianco, architect.

Maiman Associates
Valley Stream, Long Island, New York
¶ Hewlett shopping center, Hewlett, New York. (struc.) $1 million. Client, Arelson.

NORTH CAROLINA

L. E. Wooten and Company
Raleigh, North Carolina
¶ Rendering and grinding plants, feed processing, office and truck storage. (civil, struc.) $1 million. Client, Cape Fear Feed Products, Inc.

OHIO

H. P. Peterson, Municipal Consultant
Maple Heights, Ohio
¶ Sanitary sewers, pumping stations, and water mains. (civil) $350,000. Client, Bedford Heights, Ohio.

Slabe & Mackay
Cleveland, Ohio
¶ Storm and sanitary sewer, Seven Hills, Ohio. (civil) $213,000. Client, Seven Hills Property, Inc.
¶ Storm and sanitary sewer, concrete paving, Brook Park, Ohio. (civil) $105,000. Client, Dale Brook Development Co.
¶ Storm and sanitary sewer, water main, City of Cleveland, Ohio. (civil) $26,000. Client, Manning-Campbell Realty Co.
¶ Concrete paving, Brook Park, Ohio. (civil) $112,000. Client, Alvin Const. Co.
¶ Sanitary sewer, pumping station, Seven Hills, Ohio. (civil) $28,000. Client, Seven Hills Property, Inc.
¶ Concrete paving and storm sewers. Seven Hills, Ohio. (civil) $280,000. Client, Village of Seven Hills.

M. C. Welch
Lexington, Kentucky
¶ Rio Grande, Ohio waterworks improvements. Earth dam, access road, and im-

4-million bd. ft. of FOAMGLAS® insulation gives Kraft Foods, Ltd. permanent insulation value . . .

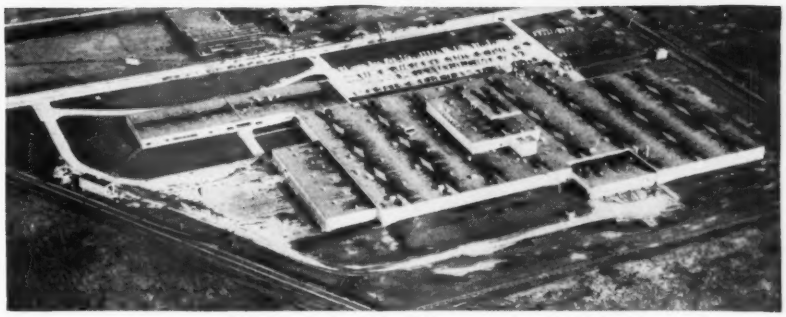


4 inches of FOAMGLAS insulate the roof area. Since this insulation is a natural vapor barrier, it prevents moisture migration into the plant below.

Vermin can't get through the inorganic glass cells of FOAMGLAS, which forms a complete insulation envelope — walls, floor and ceiling—around the Kraft products shown here.



Kraft's Montreal plant will produce a wide range of food products, including cheese, salad dressing products, caramels, marshmallows, candies and jellies.



plus free-standing partition walls . . . plus vapor-proof walls, ceilings and roof . . . plus vermin-proof storage . . . plus load-bearing insulated floors

Kraft Foods, Limited, picked FOAMGLAS, the cellular glass insulation, to provide important extra benefits for their new Montreal cheese plant. The sealed glass cell structure of FOAMGLAS insures unvarying insulating efficiency—because it makes the insulation moisture-proof. And, it does a lot more.

For one thing, it makes FOAMGLAS one of the strongest insulations. It permitted Kraft to erect free-standing walls of insulation . . . for easy, economical subdivision of storage spaces. And because FOAMGLAS is so strong, Kraft put it under concrete wearing floors where it easily stands up under both live and static loads.

Another thing: since FOAMGLAS is fully rigid and dimensionally stable, it proved a perfect choice for use in suspended ceilings in the Kraft plant.

And since FOAMGLAS is a natural vapor barrier, it's completely effective in preventing moisture migration into the cheese storage areas. That's a big help in keeping mold from forming on the cheese.

In addition to FOAMGLAS insulation, Pittsburgh Corning also makes available wall finishes and joint sealing compounds necessary for a complete installation. Write for our latest low temperature insulation literature. Pittsburgh Corning Corporation, Dept. R-99, One Gateway Center, Pittsburgh 22, Pa. In Canada: 3333 Cavendish Blvd., Montreal, Que.

PITTSBURGH PC CORNING



now! the prints you need when you need them!

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Now, Bruning's unique Copyflex Model 300 brings the advantages of inside reproduction within the means of the smallest firm or department. Right in your own offices, you make sharp, black-on-white prints in seconds of a drawing or tracing up to 30 inches wide by any length. With intermediates, you make design changes without reworking originals; you make composite prints, color overlays, and sharp prints from weak originals. You add new dimensions in convenience, speed, and efficiency to your entire operation. All at the surprisingly low cost of the Model 300!

And anyone can operate the Model 300. It needs only a 115-volt AC connection . . . is clean, quiet, odorless. An 8½ x 11″ print costs less than a penny for materials. The money and time you now spend for outside prints will pay for your new Model 300 in short order. Why not investigate?

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Company_____

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City_____ County_____ State_____

poundment clearing. (civil) $29,500; 100-gpm water filtration plant. (civil, struc., mech., elec.) $32,200; water line to distribution system (civil) $9500; altitude valve and wash water tank (civil) $5400. Client, Village of Rio Grande.

PENNSYLVANIA

Charles M. Wellons
Pittsburgh, Pennsylvania

¶ Local flood protection, Sykesville, Pennsylvania. (civil) $183,000. Client, Corps of Engineers, Pittsburgh District.

Gustav Stueber, P. E.
Pittsburgh, Pennsylvania

¶ Suburban Toy Company alteration and addition, Pittsburgh, Pennsylvania. (civil, struc.) $40,000. Client, Earl Bauer, arch.

¶ United Steel Workers of America, Local #210, Monongahela, Pennsylvania. New building, steel, concrete, and masonry. (struc.) $100,000. Client, Benjamin D. Trnavsky, architect.

¶ Extension to Pricedale Union Church, concrete, steel, and wood. Pricedale, Belle Vernon, Pennsylvania. (civil, struc.) $50,000 (est.) Client, H. Clark, arch.

¶ Toths Lynnwood Market, Lynnwood, Belle Vernon, Pennsylvania. Single story, masonry, steel, and concrete structure. (civil, struc.) $40,000. Client, H. Ernest Clark, architect.

¶ One-story rigid frame commercial building, Old William Penn Highway, Borough of Monroville, Pennsylvania, for Frank B. Olander. (civil, struc.) $45,000. Client, Victor A. Rigaumont, architect.

¶ First Federal Savings & Loan Company building, Ambridge, Pennsylvania. (struc.) $180,000. Client, Wallover, arch.

SOUTH CAROLINA

Campbell & Leppard
Greenville, South Carolina

¶ Hospital, Clinton, South Carolina. (struc., mech., elec.) $1 million. Client, Baker & Gill, architects.

¶ Office building, Henderson Advertising Agency, Greenville, South Carolina. (mech., elec.) $150,000. Client, Charles Potter, architect.

¶ Manufacturing plant, Alice Mfg. Co., Easley, South Carolina. (mech.) $2 million. Client, owner.

¶ Starr elementary school, Anderson, South Carolina. (mech., elec.) $300,000. Client, Fant & Fant, architects.

¶ Associated Reformed Presbyterian Church, Greenville, South Carolina. (mech., elec.) $350,000. Client, Fant & Fant, architects.

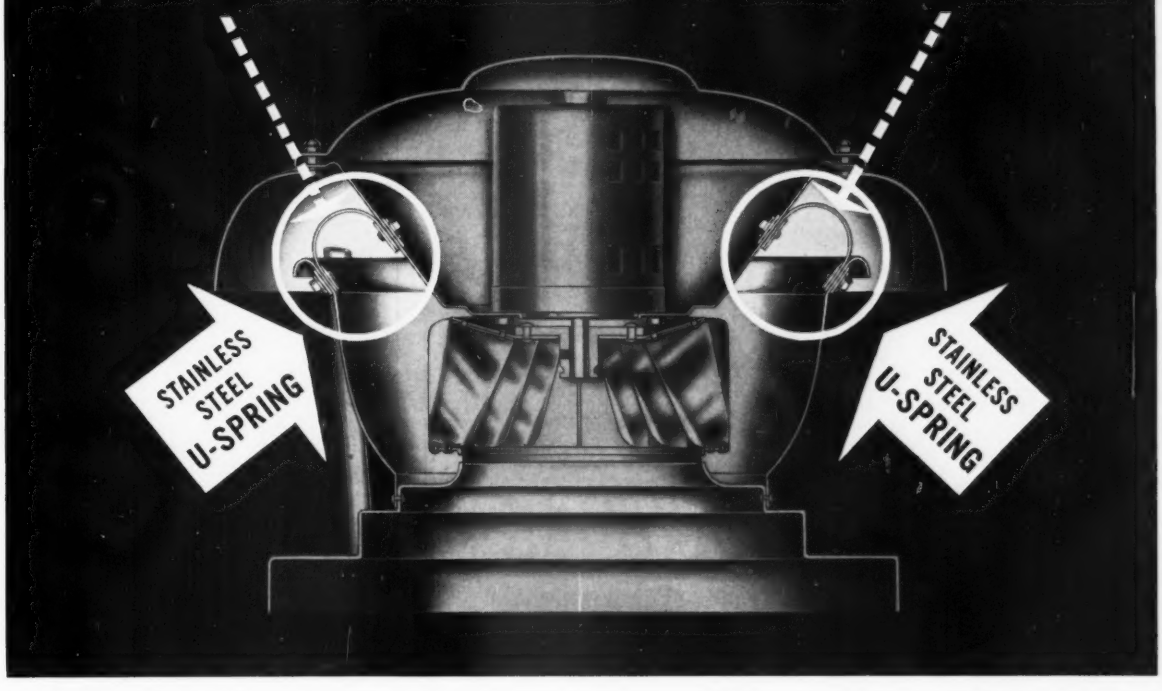
¶ Physics building, Clemson College, Clemson, South Carolina. (mech., elec.) $1.6 million. Client, Baker & Gill, arch.

¶ Manufacturing plant, Carolina Mfg Co., Greenville, South Carolina. (mech., elec.) $150,000. Client, P. H. Longstreet, arch.

¶ Electronic manufacturing plant, Florence, South Carolina. (struc., mech., elec.) $400,000. Client, Baker & Gill, architects.

¶ Physical education building, Anderson College, South Carolina. (mech., elec.)

GUARANTEED FOR LIFE!



Stainless steel U-spring noise and vibration isolators . . . a Jenn-Air exclusive!

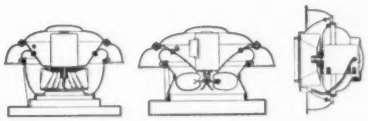
Most power exhausters depend on rubber isolators to dampen noise and vibration. Rubber does a reasonably good job when new, but it cannot withstand the ravages of heat, moisture and oil. Eventually, like the tires on your car, rubber isolators break down, leaving you with expensive repair bills or the need for complete exhauster replacement.

Dissatisfied with the impermanent nature of rubber, Jenn-Air engineers set out to develop a vibration isolator that would not break down. What they perfected was a unique power assembly suspension system built around stainless steel U-springs. Three to five U-springs are now used in each direct driven Jenn-Air Exhauster. They eliminate noise by isolating both radial and lateral vibration . . . and they're *guaranteed for life.*

In addition to providing lifetime service, Jenn-Air U-springs absorb 44% more vibration than rubber isolators. This fact was proved conclusively in independent tests conducted by the Pittsburgh Testing Laboratory.

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$350,000. Client, Fant & Fant, architects.
¶ Hospital, Whitten Village, South Carolina. (struc., mech., elec.) $1 million. Client, Baker & Gill, architects.

TEXAS

I. A. Naman & Associates
Houston, Texas
¶ Post Oak Center, Houston, Texas. (mech., elec.) $1.5 million. Client, William G. Farrington Company, owner.

VIRGINIA

Patton and Kelly
Fairfax, Virginia
¶ Athletic field, storm drainage, and parking lot for Annandale High School, Annandale, Virginia. (civil) $100,000 (est.) Client, Fairfax County School Board.

WASHINGTON

Worthen, Wing, Seifert & Forbes
Tacoma, Washington
¶ Storm pumping station at Cleveland Way on the Puyallup River, Tacoma, Washington. 130-cfs capacity. Joint venture with Brown & Caldwell, San Francisco, California. (civil) $200,000. Client, Public Works Department, City of Tacoma, Washington.

WEST VIRGINIA

Mater Engineering
Corvallis, Oregon
¶ Sawmill for Union Carbide and Chemicals Company. Design mill and plan automation features. $140,000. Client, Union Carbide and Chemical Co., Sanderson, West Virginia.

L. E. Wooten and Company
Raleigh, North Carolina
¶ Outside plant and dial switchboard equipment for 1750 stations, Davis, West Virginia. (elec.) $805,000. Client, United Utilities of West Virginia, Inc.

WISCONSIN

R. J. Strass, Inc.
Milwaukee, Wisconsin
¶ Sheboygan Falls Bank, drive-in banking windows, civic meeting hall with bank. (struc.) $150,000. Client, Eugene Wasserman, architect.

FOREIGN

M. N. Dastur & Co. Private Ltd.
Calcutta, India
¶ New 14-inch merchant mill at Jamshedpur. (struc., civil) $8 million. Client, Tata Iron & Steel Company, Ltd., Jamshedpur.
¶ Nitric acid plant, nitro-limestone plant, and bagging plant for fertilizer plant at Rourkela for Hindustan Steel Limited. (struc., civil) $16 million. Client, Sindri Fertilizer & Chemicals Ltd., Sindri.
¶ Fourth Government integrated steel plant, Bokaro, Bihar State, India. Preliminary report covering estimated steel



What's doing with flame-retardant

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7. Has less deformation at operating temperature than neoprene.
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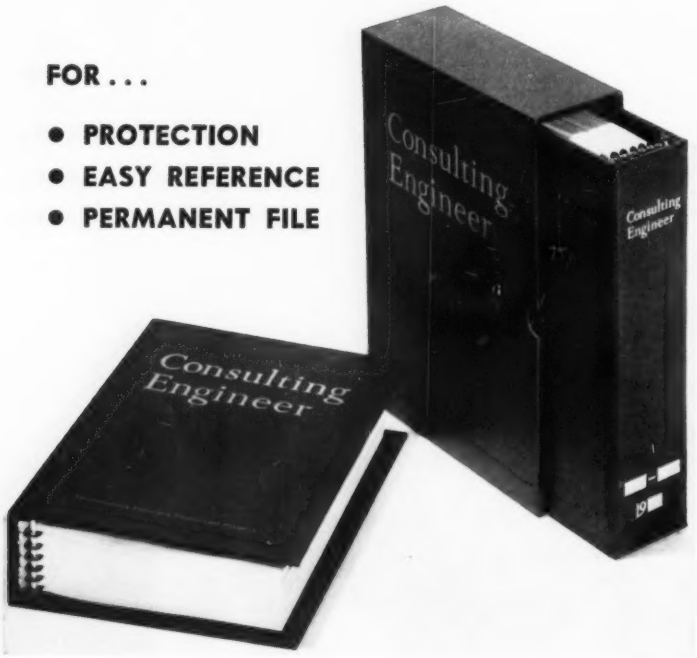
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requirements for India, raw materials, selection of production processes, plant layout, capital investment, and production costs. $450 million (cost of plant).
¶ Mysore ferro-silicon plant. (struc., civil) $2 million. Client, Mysore Iron & Steel Works, Bhadravati.
¶ Surface coal handling plant at Saunda Colliery. (struc., civil) $500,000. Client, National Coal Development Corp., Ranchi.

The Fluor Corporation, Ltd.
Los Angeles, California
¶ Engineer and procure materials for gas processing plant near Carstairs, about 40 miles north of Calgary, Alberta, Canada. $3.5 million. Client, Carstairs Operators' Committee of Calgary, Alberta, Canada.

Ken R. White Consulting Engineers, Inc.
Denver, Colorado
¶ Afghan Regional Transit Project consisting of 320 miles of new highway between Kabul and Kandahar; reshaping, drainage, and surfacing of 65 miles of existing roadway between Kandahar and Spin-Baldak; 220-meter bridge across Tarnak River near Kandahar; and railroad terminal at Afghanistan-Pakistan border near Spin-Baldak. Design, soils work, photogrammetric surveys, and construction supervision. Client, Royal Government of Afghanistan, monitored by International Cooperation Administration in Washington and Kabul.

Mater Engineering
Corvallis, Oregon
¶ Sawmill for Mayo Lumber Company, Duncan, British Columbia. Design mill and automation features, engineer complete project, supervise contracting, equipment selection, personnel selection. $1 million. Client, Mayo Lumber Co.

Meschino & Associates
Toronto, Ontario, Canada
¶ Riverdale Hospital, Toronto, Ontario. New 800-bed hospital for chronic and convalescent patients. Complete remodeling of two old buildings for an additional 200 beds. (mech., elec.) $5 million. Client, Chapman & Hurst, architects.

Stadler Hurter International Ltd.
Montreal, Quebec, Canada
¶ 80 metric ton/day Esparto Pulp Mill, Kasserine, Tunisia. (struc., civil, mech., elec.) $10 million. Client, Société Nationale Tunisienne de Cellulose.
¶ 100 metric ton/day newsprint mill, Guararema, Sao Paulo, Brazil. (struc., civil, mech., elec.) $13 million. Client, Industria de Papel Guararema.

C. C. Lindsay, C.E. & O.L.S.
Montreal, Quebec, Canada
¶ Cote Saint-Luc Branch Little St-Pierre collector sewer. (civil) $1.2 million. Clients, City of Montreal, City of Cote Saint-Luc, City of Lachine, Town of Hampstead, Town of Montreal-West, and Town of St-Pierre.
¶ Railway crossing elimination, City of Cote Saint-Luc. (struc.) $600,000. Client, City of Cote Saint-Luc. ▲▲



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Nantucket Cottage Hospital	Nantucket, Mass.
Webster County Hospital	Red Cloud, Nebr.
De Paul Hospital	Norfolk, Va.
Bakersfield Memorial Hospital	Bakersfield, Calif.
Sutter Creek Hospital	Sutter Creek, Calif.
Sinai Hospital	Baltimore, Md.
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Consulting Engineers' Calendar

Sept. 7-11. Illuminating Engineering Society; National Technical Conference, Fairmont and Mark Hopkins Hotels, San Francisco, California.

Sept. 9. American Institute of Consulting Engineers; Luncheon Meeting, Engineers Club, New York, N.Y.

Sept. 17-18. American Society of Mechanical Engineers and American Institute of Electrical Engineers; Seventh Annual Engineering Management Conference, Statler Hilton Hotel, Los Angeles, California.

Sept. 20-23. American Society of Mechanical Engineers; Petroleum-Mechanical Engineering Conference, Rice Hotel, Houston, Texas.

Sept. 27-30. American Institute of Chemical Engineers; National Meeting, Hotel St. Paul, St. Paul, Minn.

Sept. 29-Oct. 1. National Association of Corrosion Engineers; Western Region Conference, Bakersfield Inn, Bakersfield, California.

Sept. 30-Oct. 2. Producers' Council; Annual Convention, Chase-Park Plaza Hotel, St. Louis, Missouri.

Sept. 30-Oct. 2. American Society of Mechanical Engineers, American Institute of Electrical Engineers; National Power Conference, Hotel Muehlebach, Kansas City, Missouri.

Oct. 5-8. National Association of Corrosion Engineers; Northeast Region Conference, Lord Baltimore Hotel, Baltimore, Maryland.

Oct. 11-16. American Society for Testing Materials; 3rd Pacific Area National Meeting, Sheraton-Palace, San Francisco, California.

Oct. 11-16. American Institute of Electrical Engineers; Fall General Meeting, Morrison Hotel, Chicago, Illinois.

Oct. 19-23. American Society of Civil Engineers; Annual Convention, Hotel Statler, Washington, D. C.

Oct. 20. American Institute of Consulting Engineers; Annual Dinner, Mayflower Hotel, Washington, D. C.

Oct. 20-22. American Standards Association; 10th National Conference on Standards, Sheraton-Cadillac Hotel, Detroit, Michigan.

Oct. 26-28. American Road Builders' Association; National Highway Conference, Leamington Hotel, Minneapolis, Minnesota.

Oct. 27. Association of Consulting Chemists and Chemical Engineers, Inc.; Annual symposium and banquet, Hotel Shelburne, New York, N. Y.

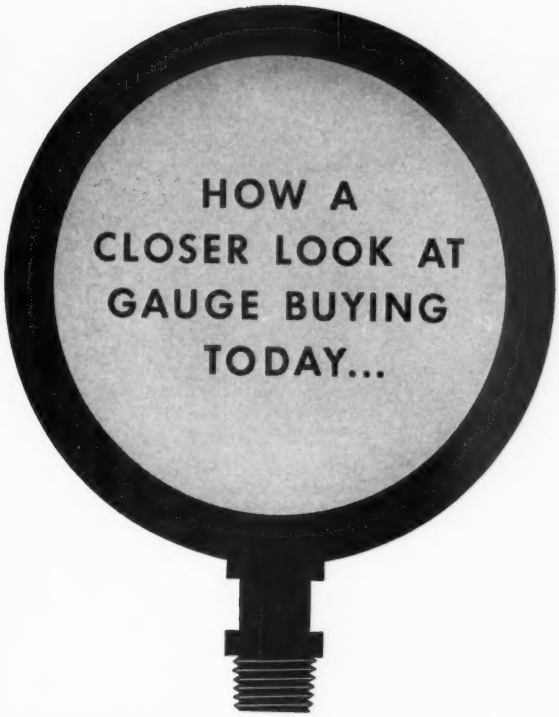
Nov. 1-7. Prestressed Concrete Institute; Fifth Annual Convention, Deauville Hotel, Miami Beach, Florida.

Nov. 3-5. American Concrete Institute; Regional Meeting, Continental Hilton Hotel and Hotel Del Prado, Mexico City, Mexico.

Nov. 4. American Institute of Consulting Engineers; Luncheon Meeting, Engineers Club, New York, N. Y.

Nov. 16-19. American Institute of Electrical Engineers; Fifth Conference on Magnetism and Magnetic Materials, Sheraton-Cadillac Hotel, Detroit, Michigan.

Nov. 30-Dec. 4. 27th Exposition of Chemical Industries, New York Coliseum, New York, N. Y.



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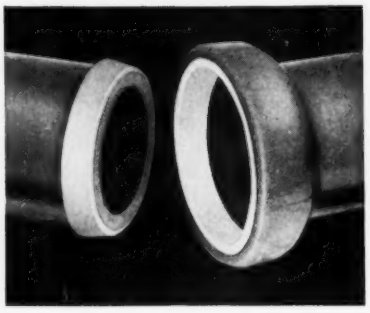
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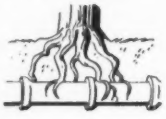
Slipshod, careless, and inferior construction methods only result in continuous maintenance, expense, and repair.

This is especially true in the construction of sanitary sewers.

The Amvit* Joint, made of plasticized resins of plyvinyl chloride, was designed to eliminate the human error that often occurred when old-fashioned jointing methods were used. Tight joints are a *must*, and can only be obtained by using the best materials and workmanship. Here's why over 100,000 miles of Amvit are now in use across the nation:—

1. PREVENTS ROOT PENETRATION

Roots may force the pipe out of line and clog the system. Amvit is a compression joint on the ball and socket principle. The surfaces of both bell and spigot are in constant compression. And, since it is a bottletight joint, roots *cannot* enter the line.



2. RESISTS CHEMICAL ATTACK

Acid laden, high temperature sewage discharged from dishwashers, garbage disposal units, and washing machines will soften, warp, and blister substitute non-clay pipe. Like clay pipe, itself, Amvit Joint is not harmed by most acids, and will not corrode, decompose, or rot.

3. RESISTS ACID ATTACK

Grease and scum tend to build up inside the pipe. The resulting acid formation attacks and destroys certain synthetic substitute non-clay pipes. The design of the Amvit Joint assures that the pipe is self-centered at all times. This gives perfect alignment and self-cleansing action.

4. ELIMINATES EROSION AND DECOMPOSITION

Sand, gravel, and stones act as an abrasive and will scratch and roughen soft non-clay pipe. Because Amvit is a really tight joint, no foreign matter can possibly enter the line. And, like the pipe, Amvit Joint is unaffected by ordinary conditions of underground service.

5. COMPLETE FITTINGS

Amvit is furnished on all standard fittings as well as pipe 4″ through 24″ in diameter. This permits a uniformly tight line from house to treatment plant.





For more information on how Amvit can help cut your sewer project costs, write or call American Vitrified Products Company, National City Bank Building, Cleveland, Ohio, or our office nearest you, for this complete folder.



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Where perimeter heat is indicated, *Nesbitt Sill-line Radiation* is your prescription. The five Sill-line accessories shown here illustrate but one way this product has been designed to provide a better solution to most installation conditions. There are many others: the five enclosure styles; the six decorator colors; the one-piece back panel that permits mullion-to-mullion application on panel walls. All point up the versatility of *Nesbitt Sill-line Radiation.* For the full story, send for publication 30.

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